CRANFIELD UNIVERSITY

HANDSON CLAUDIO DIAS PIMENTA

Diffusion of environmental and social sustainability practices across the supplier base

SCHOOL OF AEROSPACE, TRANSPORT AND MANUFACTURING
Manufacturing department
Sustainable manufacturing systems centre

PhD
Academic Year: 2013 - 2016

Supervisor: Prof Peter David Ball and Dr Konstantinos Salonitis

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This thesis is submitted in partial fulfilment of the requirements for the degree of PhD

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ABSTRACT

Significant literature on sustainable supply chain management exists but there is a lack of theory explaining diffusion of sustainability practices within the supplier base led by manufacturing firms. In particular diffusion theory is insufficiently developed to characterise the development of sustainability practices in suppliers. The purpose of this research is to establish the conditions for enhancing the diffusion of environmental and social sustainability practices across the supplier base from the buying firms' perspective. The research design is based on a theory building strategy. The data analysis was carried out based on a triangulation of different sources of data (e.g. 30 interviews with directors or managers of four sustainability leading manufacturing firms from the beverage, cosmetic and textile sector, and an extensive array of documents) and cross-case analysis and application of diffusion of innovation theory (DoI).

This research identified environmental and social practices diffused through supplier selection (implementation of requirements), performance assessment and development. This map of sustainability practices provides a unique perspective; hence it distinguishes practices diffused across different supply chain tiers, as well as the mechanism/initiatives employed to diffuse them. The findings suggested that more emphasis was given to environmental practices than social practices. In general, social practices were more related to compulsory level (e.g. human rights) and were evaluated (selection), monitored (performance) and diffused through development (especially educating initiatives) in both 1st tier and 2nd tier. Critical materials suppliers in the 2nd tier were more likely to be engaged by specific procurement teams through the selection, performance and development activities, especially with the aim of meeting compliance and improving performance. The findings also suggested that joint initiatives with critical industrial suppliers focused more on environmental practices.

Diffusion of innovation theory was applied to consider different elements that have not been covered in the literature, for instance, emphasis on communication channels and social system elements. The rate of adoption of sustainability practices was directly affected by supporting suppliers in measuring and collaborating in implementing improvements plans, as well as intense educating initiatives. DoI provides a powerful lens to help explain the role of buying firms in the diffusion of sustainability practices.

The research provided a more comprehensive view on how sustainability practices were diffused through the supplier selection, performance assessment and development. This work is the first instance of considering intra- and inter-organisational factors in the same model for enhancing the diffusion of sustainability practices. Overall, this depicts patterns of the factors and points out the most critical variables influencing the implementation of sustainability practices across the supplier base.

This research has the potential to serve as an analysis tool to uncover gaps in activity that could lead to greater adoption of sustainability practices by suppliers, as well as gathering good practice in a structured way.

Keywords: Environmental and social sustainability; sustainability practices; supply chain management activities; supplier sustainability development; diffusion of innovation.

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LIST OF PUBLICATIONS

Journal papers

- Pimenta, H.C.D.; Gouvinhas, R. P.; Evans, S. Towards an eco-efficiency model for extended supply chain - Brazilian food industry. Brazilian Journal of Operations and Production Management , v. 12, p. 48, 2015.

Conference Papers

- Pimenta, H.C.D.; Ball, P.D., 2016. Towards a Framework for Sustainability Practices Diffusion. In: 23rd EurOMA conference: Interactions. Norwegian University of Science and Technology, Norway, pp. 1–10.

- Pimenta, H.C.D., Ball, P.D., Evans, S., 2016. Sustainability practices diffusion: the role of buying firms from the perspective of diffusion of innovation theory. In: Advances in Production Management Systems - Production Management. Springer, Brazil, pp. 1–8.

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- Pimenta, H. C. D.; Ball, P.D., 2013. Towards a business model for sustainable supply chain management. In: 11th International conference on manufacturing research - Advances in manufacturing technology. Cranfield University Press, UK, pp. 625–630.

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- Pimenta, H.C.D.; Ball, P.D.; Aguiar, J.A.; Evans, S., 2013. Environmental management practices within the supply chain: a case study of textile industry. In: 11th Global Conference on sustainable manufacturing - innovative solutions. Universitatsverlag der TU Berlin, Germany, pp. 1–6.

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LIST OF ABBREVIATIONS

ASR	Agriculture Sustainability requirements
BIS	Biodiversity ingredient suppliers
BS	British Standards
CF	Coffee Growers
CSR	Corporate Social Responsibility
DFE	Design for Environment
DJSI	Down Jones Sustainability Index
DoI	Diffusion of Innovation Theory
EMS	Environmental Management System
FLA	Fair Labours Association
FMCG	Fast Moving Consumer Goods
FSA	Farm Sustainability Assessment
GHG	Greenhouse Gas
GIS	Global information System
GRS	General Sustainability Requirements
H&S	Health and safety
IS	Industrial Suppliers
ISO	International Organisation for Standardisation
LCA	Life Cycle Assessment
NGO	Non-Governmental Organisation
OF	Organisational factors
PET	Polyethylene Terephthalate
QESH	Quality, Environment and Safety and Health
RBV	Resource-Based View Theory
rPET	Recycled Polyethylene Terephthalate
SAC	Sustainability Apparel Coalition
SAI	Sustainability Agriculture Initiative
SCM	Supply Chain Management
SLR	Systematic Literature Review
SMEs	Small And Medium Enterprises
SSCM	Sustainable Supply Chain Management
TBL	Triple Bottle Bottom
UEBT	Union for Ethical Bio Trade

CHAPTER 1
Introduction

1.1 RESEARCH BACKGROUND

Manufacturing firms have been increasingly challenged to consider environmental and social issues across their supplier base by different drivers such as stakeholders (e.g. non-governmental organisations, customers, shareholders, regulatory requirements, or even competitors), internal drivers (e.g. cost, risk, disruption and reputation) or mutual benefits (e.g. competitive advantage) (Lo, 2014; Srivastava, 2007; Zhu et al., 2007). Indeed, the ecological footprint of their products and services is not limited to the production stage of the final product manufactured (Nawrocka *et al.,* 2009). Firms might also have a positive effect on social issues across the entire supply chain, such as safe working conditions at suppliers facilities, labour equity, healthcare, childcare, and education (Hutchins and Sutherland, 2008).

As a consequence, many firms have sought to develop initiatives to disseminate environmental and social sustainability practices along the supplier base (Schmidt and Schwegler, 2008). From the perspective of manufacturing and sustainability it is assumed that practices are related to technology, employee development, and organisation management (including philosophies, principles, and work organisation) (Bolden et al., 1997). Sustainability is a goal of the sustainable development, defined as “the development which meets the needs of the present without compromising the ability of future generation to meet their own needs” (WCED, 1987). Sustainability is also well linked with 3BL (triple bottom line) (Elkington, 1997). In this sense, sustainability is a business objective and practices are used to further realisation of this objective. Environmental and social sustainability practices are therefore practices for the preservation of natural resources and waste reduction, as well as the inducement of a social behavior (e.g. proper working conditions, appropriate and fair wages, and high safety standards) (Hollos et al., 2012).

Indeed, manufacturing firms have a pivotal role in enhancing suppliers’ behaviour, performance and capabilities related to sustainability. Improving supplier performance or, at least assuring the acceptable performance standard is a crucial objective of supply chain management (Gold et al., 2010a). The diffusion of environmental and social sustainability practices contributes to this performance. Diffusion captures the notion of firms engaging suppliers with environmental and social sustainability practices.

This chapter sets out the research background by addressing the research gaps. The chapter also states the aim, objectives and research question required to fill this need and close the gap. Finally, the structure of the thesis is introduced.

1.2 PROBLEM STATEMENT

1.2.1 Research gaps

Traditionally, buying firms coerce suppliers to implement sustainability practices through transactional instruments, such as imposing requirements (or standards) during the selection to avoid risk and uncertainty (e.g. reputation, image, disruption and dependency) (Ayuso et al., 2013; Lo, 2014). Consequently, suppliers are likely to meet the minimum requirements, perhaps without seeing the direct benefits and value (Caniëls et al., 2013). More positively, firms seek to build more committed relationships that might facilitate diffusion of sustainability practices. For that, supplier sustainability performance assessment and development initiatives have been adopted (Agan et al., 2016; Beske and Seuring, 2014). Therefore, the diffusion of sustainability practices between buying firms and suppliers was apparently most influenced by the activities of supplier selection, supplier performance assessment and supplier development. In spite of the significant body of literature on sustainable supply chain management (SSCM), there is an absence of theory to explain how environmental, as well as, social sustainability practices is diffused across the supplier base as a result of integration of the three aforementioned supply chain management activities.

Common features have been observed in the literature on diffusion of sustainability practices to the supply base:

- Firstly, more emphasis has been given to environmental sustainability practice diffusion (e.g. Seuring and Müller, 2008) but there is a lack of clarity on the conditions required or how to address both environmental and social sustainability. Addressing both environmental and social sustainability practices can support firms in coping with different pressures, meeting long-term strategies (Varsei et al., 2014) and making more accurate predictions about the effects of the practices on the suppliers' outcomes (Marshall et al., 2015).
- Secondly, more attention has been paid to engage key first tier suppliers (Beske-Janssen et al., 2015) leaving a lack of understanding of the whole supply chain (Holt and Ghobadian, 2009).

Furthermore, contingency factors have been used to explain the drivers and enablers for the engagement of suppliers on sustainability (Tachizawa and Wong, 2014). The most frequent drivers identified are regulation, response to stakeholders (Carbone et al., 2012), manufacturing sectors and size (power) of the buyer, position of the buyer in the supply chain and geographic location of suppliers. For instance regulation, which demands environmental improvements across the supply chain, acts as a catalyst for performance improvements (Crotty, 2006). Jira and Toffel (2013) found that suppliers working in more profitable industries or located in countries with strict regulations were more likely to share information with buyers. Interestingly, many studies have been associated power and size as conditions to engage suppliers on sustainability (Ciliberti et al., 2008; Cramer, 2008). Nevertheless, this is not restricted only to large buying firms. Some empirical studies focused on small- and middle-sized firms. Nawrocka et al. (2009) revealed that the firms located close to the final customers were more involved in environmental projects with suppliers. On the

other hand, firms located in the second tier of automobile and construction industries with a lower integration with suppliers were less able to diffuse environmental practices.

Srivastava (2007) argued that more integrative contributions of organisational factors for diffusion of best practices are needed. In fact, there is little knowledge about factors that facilitate engaging suppliers and therefore enhancing the diffusion of environmental and social sustainability practices across the supplier base[1]. These organisational factors include for instance effort, initiatives and capabilities of both buying firms and suppliers (Sancha et al., 2015).

This research therefore addresses the gap in knowledge of how buyers engage their suppliers through capturing organisational factors that influence the diffusion of environmental and social sustainability practices. Moreover, supply chain management activities are considered together in a structured way in order to aid manufacturing buying firms to impact the sustainability diffusion across their supplier base. These provide insight for buying firms to address sustainability within their supply management activities more holistically.

Furthermore, to add richness to this research, the diffusion of innovation theory (DoI) (Rogers, 2003) is chosen and applied as an organisational theory background. DoI was included by Sarkis et al. (2011) in a list of promising organisational theories to enable further understanding of SSCM. Organisational theories have the power to explain a phenomenon and can drive the creation of knowledge (Boer et al., 2015). Testing and extending less popular theories can also increase the maturity in the SSCM field (Touboulic and Walker, 2015). In addition, Zorzini et al. (2015) explained that a significant contribution to knowledge can be reached by the development of expertise and application of one specific theory. The focus of DoI captures the transfer of practices between two separate parties. For instance, the diffusion can occur from one firm of the supply chain to another or through whole supply chain (Carbone et al., 2012).

1.2.2 Research aim and questions

This research explores the sustainability practices diffusion in the field of supply chain management. The aim of this PhD project, therefore, is:

to establish the conditions for enhancing the diffusion of environmental and social sustainability practices across the supplier base from the buying firms' perspective.

This research started with a general inquiry regarding the sustainability practices diffused across the supply chain in order to understand how scientific knowledge has been covering this subject, to use it to compare with the insights from the data collection adopted in the research and to build a sustainability practices diffusion theory. Then, the sustainability practices diffused, the influential organisational factors and the application of DoI theory to add richness to the empirical findings and theoretical contribution are the key

[1] Group of suppliers managed by the buyers through contracts and engaged in value-adding

aspects covered in the other research questions. Therefore, the research questions are:

(RQ1) How are environmental and social sustainability practices diffused across the supplier base?

(RQ2) What sustainability practices are diffused through the supply chain management?

(RQ3) What are the influential organisational factors in the supply chain management activities for diffusion of environmental and social sustainability practices?

(RQ4) How do organisational factors affect the diffusion of sustainability practices across the supplier base?

(RQ5) How can sustainability diffusion across the supplier base be enhanced (buyer perspective) based on the diffusion of innovation theory?

The research questions are proposed based on an understanding of the literature and are designed to achieve the aim of this research (Figure 1.1). They are also addressed in the philosophical position and methodological choice presented in Chapter 6.

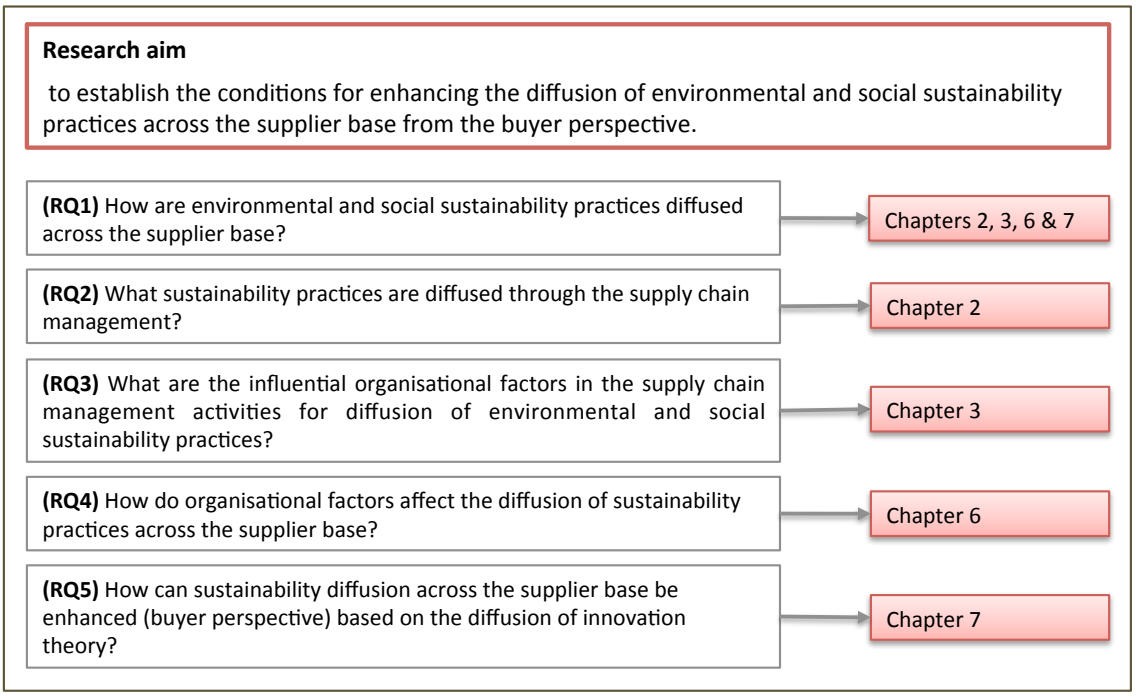


Fig. 1.1: Research aim, objectives and research questions.

1.3 THESIS STRUCTURE

This thesis comprises eight chapters (see figure 1.2, p. 6). This was designed and conducted through a dynamic process which allowed the rethinking and reviewing the research process, instead of in a linear way. The structure of the thesis and highlights of the main content is presented as follows:

- Chapter 1 introduces an overview of the thesis, including the research background, research gap, research aim and objectives and research questions.

- Chapter 2 presents a systematic literature review. It focuses on exploring the knowledge in the sustainable supply chain management. This enabled the exploration of the research gaps and provides key concepts related the supply chain management activities and environmental and social sustainability practice.

- Chapter 3 provides the influential organisational factors for diffusion of sustainability practices across supplier base. The findings drive the development of the conceptual framework.

- Chapter 4 introduces the organisational theory background chosen as a lens to add richness for the analysis of the findings. This chapter presents the concepts and elements of the Diffusion of Innovation theory (Roger, 2003) and analyses the application of DoI in the context of SSCM.

- Chapter 5 sets out the philosophical paradigm of this research. Moreover, it identifies an appropriate research methodology. Then, the empirical design is presented, highlighting the data collection and analysis.

- Chapter 6 presents the analysis of four in-depth case studies. It provides the empirical evidence for the research.

- Chapter 7 advances the understanding of the diffusion of sustainability practices across the supplier base. It presents a cross-case analysis, highlighting the patterns and findings that emerge. The findings are discussed based on the conceptual framework and in relation to current literature. The organisational factors found are also analysed with the lens of the DoI in order to add richness to the findings.

- Chapter 8 identifies the contribution to the knowledge. Limitations of the research and the opportunities for further research are also presented.

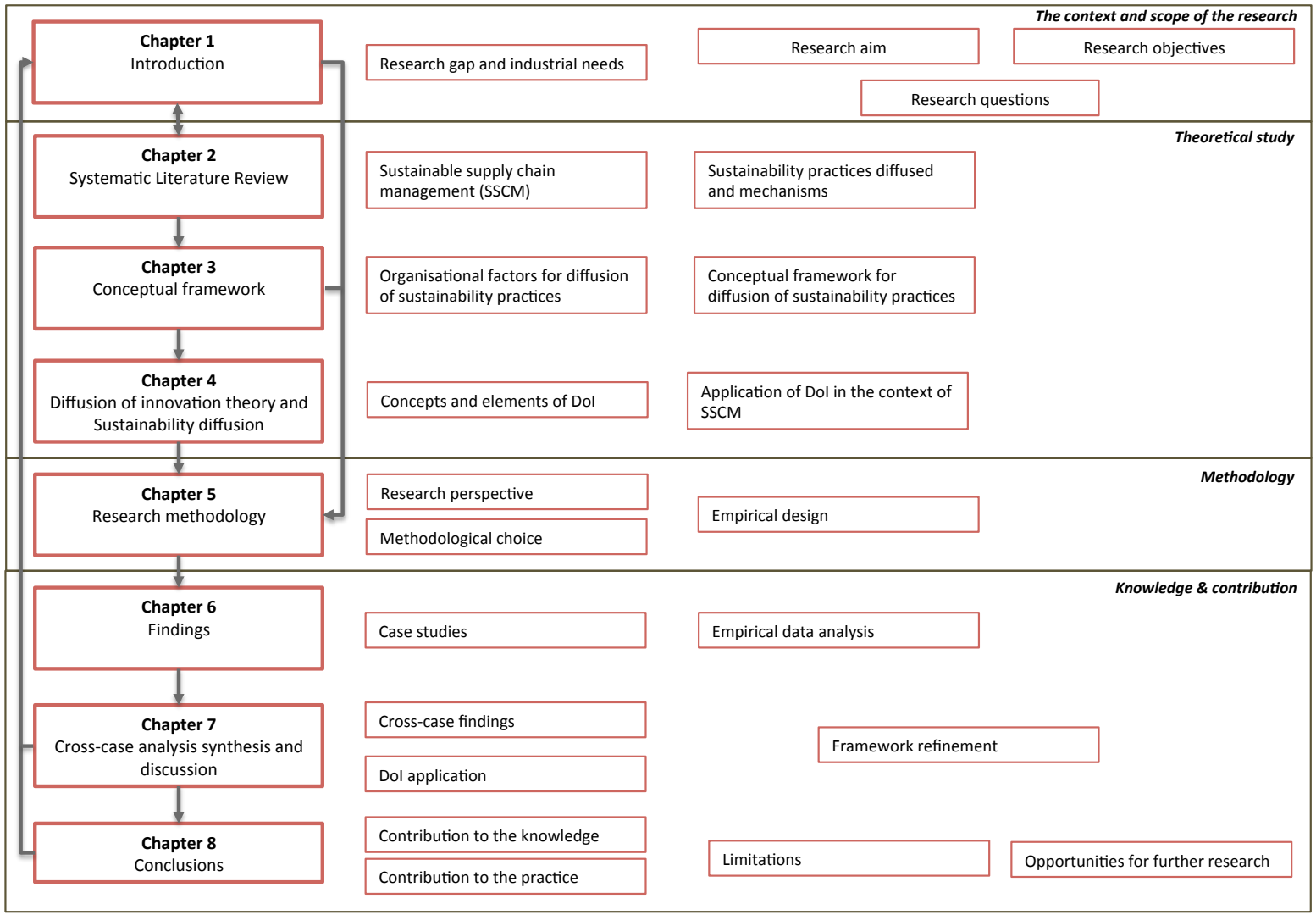


Fig. 1.2: Thesis structure

CHAPTER 2

Systematic Literature Review

2.1 INTRODUCTION

This chapter explores the existing literature on the environmental and social sustainability practices diffused by manufacturing firms through supply chain management activities. The gap in the knowledge that the research is filling is also covered in this chapter through a systematic literature review (SLR).

SLR is appropriated and effective for this research because is a reliable form of review once it addresses explicit and rigorous methods (Denyer and Tranfield, 2006). A SLR enables the researcher both to map and to assess the existing intellectual territory and to specify a research question to develop the existing body of knowledge further (Tranfield et al., 2003). It differs from traditional reviews by adopting a replicable, scientific and transparent process to minimise bias through exhaustive literature search and analysis (Tranfield et al., 2003). Systematic review is therefore a process employed in this research to identify, appraise and synthesise all relevant studies (Kitchenham, 2004), following a pre-determined explicit method which must be replicable, transparent, and scientific (Pilbeam et al., 2012).

A content analysis of articles published in the last 23 years was covered. This chapter therefore addresses the research questions RQ1 and RQ2:

(RQ1) How are environmental and social sustainability practices diffused across the supplier base?

(RQ2) What sustainability practices are diffused through the supply chain management?

2.2 METHOD

A systematic literature review (SLR) was conducted based on Tranfield et al. (2003), Denyer and Tranfield (2006) and Denyer and Tranfield (2009). A SLR enables the researcher both to map and to assess the existing intellectual territory and to specify a research question to develop the existing body of knowledge further (Tranfield et al., 2003). This systematic review follows a protocol made up of four steps: planning, searching, screening, and content analysis, as described below (Figure 2.1, p. 8).

2.2.1 Planning and searching

This SLR is guided by the research questions RQ1 and RQ2, which is a way to establish the focus of the research (Denyer and Tranfield, 2009). For that, supply chain management activities were investigated in order to understand

how environmental and social sustainability practices are considered by them and what are the diffused practices.

Initially some relevant and well known and cited papers on sustainability across supply chain were selected, such as Gimenez and Tachizawa (2012) and Seuring and Müller (2008). From these papers, some potential key-words were identified and tested using the Scopus data base. A high volume of papers on sustainable supply chain were found. For example, using the string ["sustainab*" and "supply chain"], more than 2,800 documents were found (Initial Collection). Finally, some papers were selected in order to confirm a set of key-words. This approach was suggested to encompass a specific topic that can be broadly addressed (Brandenburg et al., 2014).

In order to encompass a representative number of materials more closely related to the research question, two groups of key-words in line with environmental and social sustainability ("sustainab*", "environment*", green, "closed loop", "industrial ecology", "social responsibility", reverse, governance) and SCM ("supply chain", "value chain", network, relationship, "collaborat*", "co*operation", performance, purchasing, procurement) were used to construct search strings with the Boolean connectors "and".

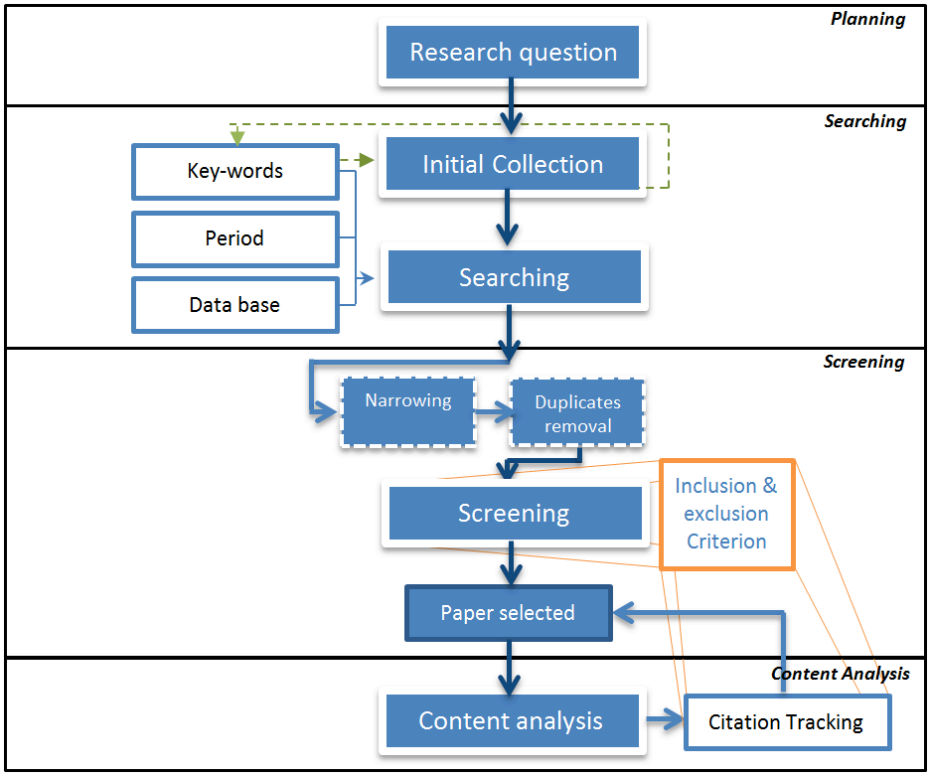


Fig. 2.1: Research protocol. Source: (Denyer and Tranfield, 2006; Tranfield et al., 2003).

The strings were then used to search materials between the periods 1992 to 2013 in databases. Then, the same procedure was applied again to covered the publications in 2014 and 2015. Interestingly, the Conference on Environment and Development was held in 1992 by the United Nations. The conference discussed the goals of the Brundtland report which first proposed the concept of sustainable development, being "the development which meets the needs of the present without compromising the ability of future generation to meet their own

needs" (WCED, 1987). From this date, investigations on the relationship on poverty and environmental degradation and the need to find new production and consumption standards for this and the future generations were conducted by several researches. Moreover, according to Seuring and Müller (2008) and Srivastava (2007), most research related to SSCM has been published after 1990. Based on this, 1992 was chosen as the starting year.

Databases used were Scopus, Web of Science, EBSCO (Business Source Complete, Environment complete and GreenFILE) and ABI. The main criterion to choose a database was that it needed to be related to the field of manufacturing, sustainability (both environmental and social sustainability dimension) and supply chain management and index well-rated journals.

2.2.2 Screening

The systematic search was made up of two strategies. Firstly, papers were searched using the "all fields". This search was based on all possible combinations between those two groups of keywords in order to take into account papers more representative with the research question. In total 20,059 papers were found. Taking into account the high volume of materials it was considered reasonable to narrow the search due to quality of contribution just to include only peer-reviewed scientific papers in English, resulting in 10,814 papers. Removing duplicates by using the software Endnote reduced the papers found to 4,131.

The title and abstract were read using explicit inclusion and exclusion criteria in order to select relevant papers. This followed (Denyer and Tranfield, 2006), who stated that inclusion and exclusion criteria should be based on the research question and be piloted to ensure that they can be reliably interpreted and that they classify studies correctly. Specifically, the paper needed to provide any insight on the relationship between a manufacturing buying firm (e.g. leading firms, focal firms and OEM – terms commonly adopted in the literature) and member(s) of the supplier base regarding the dissemination of environmental and social sustainability practices.

Papers were excluded when they did not cover this relationship within the supply chain management domain. Other exclusion criteria were: ethical and humanity issues, opinion of stakeholders on sustainability, public purchasing and services supply chain (bank, hotel, supermarket, hospital, education, supply of water, e-market), energy production (electricity supply issues) and application of software or mathematical models without interaction of suppliers. In general, the most common reasons for the elimination of these papers were: 1) strong focus on supply chain management activities without covering diffused sustainability practices across the suppliers, 2) application of software based on secondary data to estimate environmental impact across the supply chain and 3) manufacturing sectors which did not fit.

A total of 125 papers resulted from the screening process. Finally, cited references were used as a secondary source (Citation tracking). A further 15 papers were included. In consequence, these three stages resulted in a total of 140 papers, which were then coded and analysed.

2.2.3 Screening and content analysis

In order to identify the relevant issues related to the diffusion of sustainability practices across the supply chain, the content of the selected papers was analysed, taking into account the aspects presented in Table 2.1. Content analysis is increasingly used large amount of data (Easterby-Smith et al., 2012; Miles et al., 2014). Same approach was adopted by other papers that employ systematic literature review, such as Ahi and Searcy (2013), Gold et al. (2010b) and Igarashi et al. (2013).

Table 2.1: Categories adopted in the content analysis

Area	Category	Description	Source
Descriptive	Year, sustainability dimensions, methodology employed, academic field, journal, country and industrial sector	Bibliographic data.	(Robson, 1993; Seuring and Müller, 2008; Stechemesser and Guenther, 2012; Wacker, 1998)
Thematic	Analysis of sustainability practices and supply chain management activities	The activities involved in SCM, the scope of SCM (e.g. upstream – focus on suppliers, downstream – focus on clients, life cycle view), as well as sustainability practices considered by the SCM activities	Author

2.3 DESCRIPTIVE ANALYSIS

The body of the literature covered in this systematic review is still a young field; hence the majority was released in the last 10 years (approximately 84%) (Figure 2.2, p. 11). By 2000, a total of seven papers were published, all of them covering just the environmental dimension. Roy and Whelan (1992) was the first paper identified. From 2001 to 2010, 54 papers were released 50% of these papers encompassed only environmental sustainability. Interestingly, Bakker and Nijhof (2002) was one of the first papers to cover social sustainability and Polgreen (2002) both environmental and social sustainability. Three papers in 2008 covered the concept of triple bottle bottom (TBL) in the context of supply chain management (Carter and Rogers, 2008; Seuring and Müller, 2008; Vachon and Klassen, 2008). Finally, more than 55% of the papers analysed (76 papers) were published between 2011 and 2015 showing a significant interest both in environmental and social sustainability and TBL. Figure 2.3 (p. 11) presents the distribution of publications in years according to the dimensions of sustainability. In general, considering the period studied it is more common to find research covering just one or two dimensions of sustainability, for instance only environmental or environmental and economic issues. Papers on pure economic issues across supply chain are not included in this literature review.

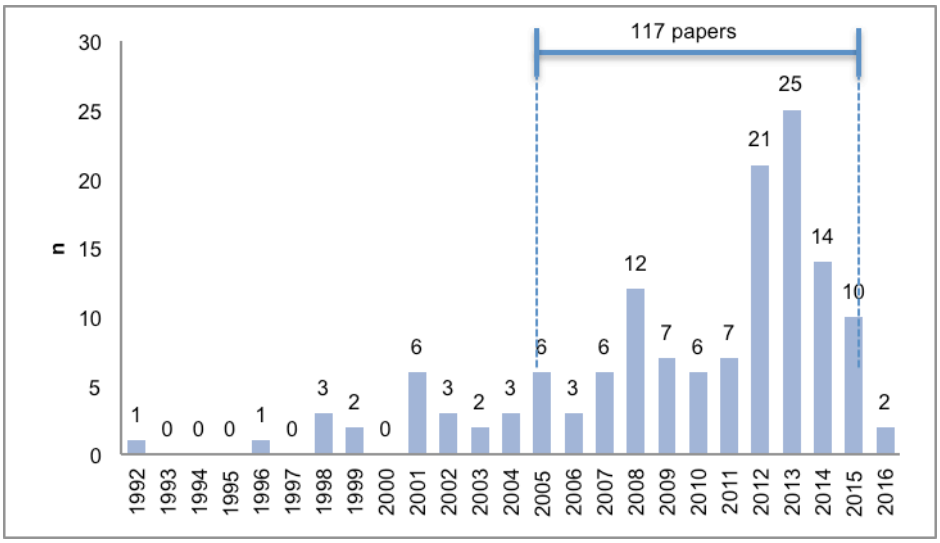


Fig. 2.2: Distribution of the papers reviewed.

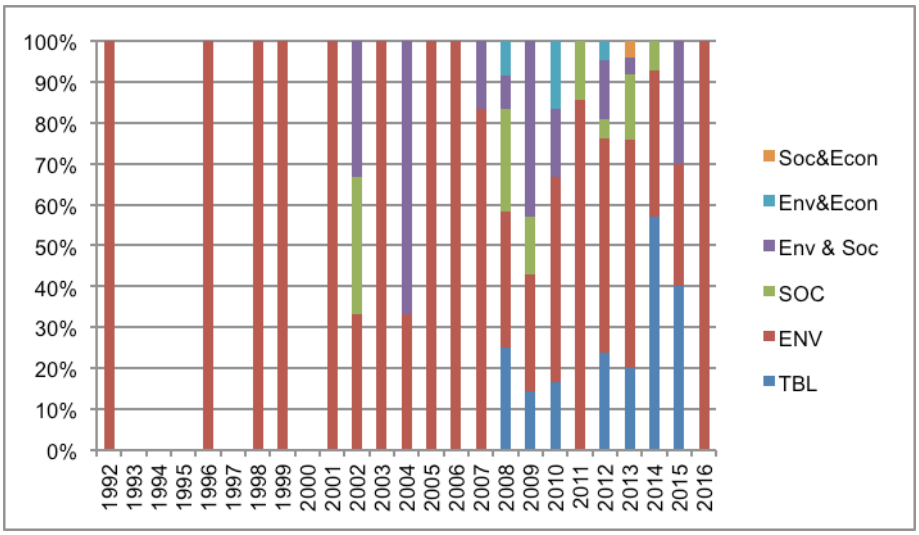


Fig. 2.3: Distribution of the papers reviewed according to the dimensions of sustainability.

Most of the papers reviewed were based on empirical data (67%), including case studies (42 papers), survey (39 papers), secondary data (public reports or databases) (11 papers) and a mix of methodologies (e.g. survey and cases study) (2 papers). Forty-six papers (33%) were based on literature reviews, including systematic literature review (19 papers) and meta-analysis[2] (1 paper). Interestingly, since 2012 the review papers have adopted a systematic review as the main method to conduct a review of the literature (Appendix A). This suggests that the reviews have been conduct with more robustness. The vast majority of the papers were published by researchers from management/business departments (96 papers). This was followed by environmental science/engineering (13 papers) and manufacturing (12 papers).

[2] This consists of a review method for determining the overall effect of the relationship between variables by summarising the outcomes of a huge number of quantitative studies and conducting statistics test (Bryman and Bell, 2007).

Even sustainability is an interdisciplinary field; the management/business schools have prominence in the sustainable supply chain management field. It has contributed more significantly with empirical papers. Overall, the academic schools have contributed with both conceptual and empirical papers (Figure 2.4). Interestingly, contribution was also found from practitioners, including managers and policy makers.

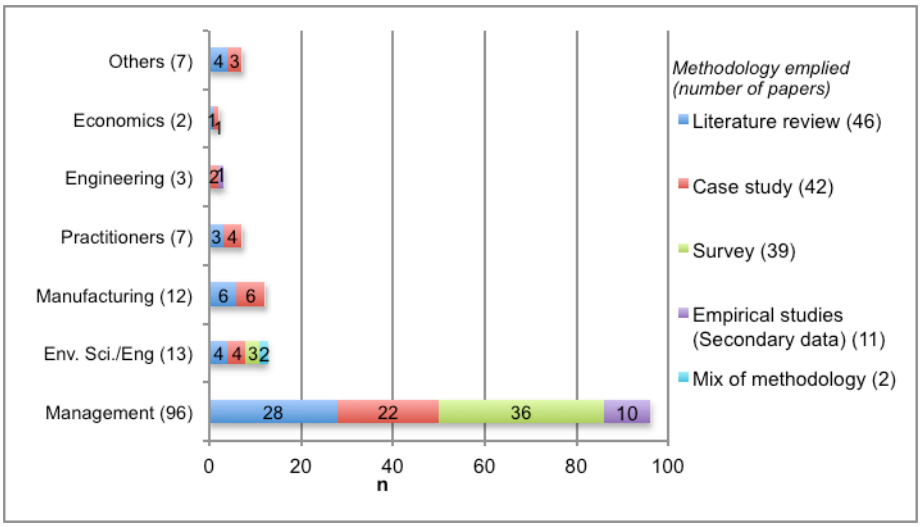


Fig. 2.4: Distribution of the papers reviewed according to the methodology employed and the academic schools.

In terms of geographical location, the country in which the research was developed was taken into account. A total of 23 countries in six continents (Europe – 68 papers, North America – 42, Asia – 19, Oceania – 4, South America – 3, and Africa – 1) were interested in this subject literature (Appendix B). This suggests a global interest in this academic field. Particularly, the United States (34 papers), the United Kingdom (21) and Germany (17) covered more than 51% of the papers. Even though most studies focused on three single countries, two studies have a huge scope hence the supply chain was located in more than one country, such as Hong Kong and US or China, US and Emirates.

Regarding the journals, 49 different journals were included, 71% from the field of supply chain management, manufacturing or operational management and 29% from sustainability. Journal of Cleaner Production took a dominant role with 25 papers. It was followed by “Supply chain Management: an International Journal” and “International Journal of Production Economics”. The list of the main journals is illustrated in the Figure 2.5 (p. 13). This list covers 70% of the total of journals selected.

Table 2.2 (p. 13) points out the sectors covered by empirical studies. Both in surveys and case studies, the technological area is the main domain studied, such as automotive and electric and electronic sectors. Interestingly, the diverse sector is made up of a combination of different sectors, such as manufacturing, transport and logistics, retail, utilities, construction, or transport, commerce, manufacturing and construction, especially covered in surveys or multiple case studies.

Fig. 2.5: Distribution of the papers reviewed based on the main journals.

Table 2.2: Industrial sectors covered by empirical papers.

Industrial sectors	Case study (C)	Survey (S)	C+S	Secondary data	Total	Some examples of papers
Automotive	8	2	1	0	11	(Caniëls et al., 2013; Crotty, 2006)
Electrical and electronic industry	8	1	1	0	10	(Mcintyre et al., 1998; Roy and Whelan, 1992)
Food industry	4	0	0	0	4	(Hagelaar and Vorst, 2002; Salvá et al., 2013)
Retail	0	3	0	0	3	(Elg and Hultman, 2011; Thornton et al., 2013)
Textile industry	3	0	0	0	3	(Ciliberti et al., 2009; Diabat et al., 2014)
Packaging industry	0	2	0	0	2	(Vachon and Klassen, 2008, 2006)
Furniture industry	0	2	0	0	2	(Michelsen, 2006; Walton et al., 1998)
Chemical industry	1	0	0	0	1	(Leppelt et al., 2013)
Computing industry	0	1	0	0	1	(Rosen et al., 2001)
Telecommunication	1	0	0	0	1	(Fu et al., 2012)
Irrigation equipment	1	0	0	0	1	(Dou et al., 2014a)
Diverse industrial sectors	16	28	0	11	55	(Srai et al., 2013)
Total	42	39	2	11	94	-

In general, this section covered a bibliographic analysis. This descriptive analysis overall covers some interesting observations. However, most importantly it does not uncover anything of concern and the thematic analysis will proceed.

2.4 THEMATIC ANALYSIS

2.4.1 Sustainable supply chain management: a starting point

There is no universal definition for sustainable supply chain management. It is generally accepted that it is a broad subject in itself; hence it covers three dimensions of sustainable development, i.e. economic, environmental and social. Seuring and Müller (2008, p. 1700) defined SSCM as "the management of material, information and capital flows as well as cooperation among companies along the supply chain while taking goals from all three dimensions of sustainable development". Basically, the authors considered that suppliers needed to fulfil environmental and social criteria while maintaining competitiveness by meeting customer needs.

In addition, there is a variety of constructs used by authors in an attempt to define SSCM (Touboulic and Walker, 2015a). For instance, Carter and Rogers (2008) proposed the SSCM concept based on the triple bottom of line concept defined by Elkington (1997) and four supporting facilitators of sustainability (risk management, strategy – sustainability integrated in overall strategy, transparency – stakeholders engagement and supplier operations, and culture – values and ethics). The study conducted by Ahi and Searcy (2013) found 22 definitions for green supply chain (environmental sustainability perspective) and 12 definitions for sustainable supply chain. Based on that, they considered that SSCM was made up of business sustainability elements (e.g. economic, environmental and social focus, stakeholder, volunteer, resilience, and long-term) and supply chain management elements (e.g. flow, coordination, stakeholder, relationship, value, efficiency, and performance).

The scope of sustainable supply chain management is also wide, ranging from purchasing to integrated life-cycle management (Zhu et al., 2008), which has a clear direct resonance with the product life cycle (Lamming and Hampson, 1996). Based on that, considering the material flow perspective as well as the information and capital flow, sustainable supply chain management is considered in two directions traditional directions of supply chain, i.e. downstream and upstream (Sarkis, 2012). In upstream supply chain, raw material extraction, materials processing, components manufacturing, and assembly manufacturing (cross-functions) have been normally involved. This means that not only first tier suppliers should be included, but also second and *n* tier supplier as well as some supply networks formed (Grimm et al., 2014; Tachizawa and Wong, 2014). Downstream in turn encompasses the distribution, warehouse, retailers, customers, and product end-of-life (EOL) management. The EOL management is in respect to reverse material flow (Brandenburg et al., 2014; Srai et al., 2013; Zsidisin and Siferd, 2001).

As a consequence of this broad SSCM scope different organisational functions and activities are involved, like design, purchasing, material management, packaging, manufacturing management, distribution/marketing and reverse logistics (Hervani et al., 2005; Srivastava, 2007). Furthermore, SSCM are also integrated with inter-organisational relationships (Ahi and Searcy, 2013; Seuring and Ossietzky, 2004). These are associated with the characteristics previously mentioned, such as management of material, information, and capital flows associated with the procurement, production, and

distribution of products or services. Accordingly, this diversity of function involved and inter-organisational relationship in supply chain management makes the SSCM field more complex.

Supply chain management activities have the power to influence suppliers to reach higher levels of sustainability (Lee and Klassen, 2008). According to Sarkis et al. (2011) this includes imposing environmental specification on suppliers and auditing suppliers' environmental management systems. Three key functional activities in supply chain management, namely supplier selection, supplier performance assessment and supplier development were found effective in engaging suppliers on sustainability.

Supplier selection is considered to have the most potential to address sustainability within suppliers (Ashby et al., 2012), hence it is a crucial boundary-spanning function, linking buying firms with their suppliers (Zsidisin and Siferd, 2001). Moreover, supplier performance assessment allows buying firms to understand better the environmental impact of their suppliers (Simpson and Power, 2005), to identify what actions are needed (Gimenez and Tachizawa, 2012) and to control the implementation of the sustainability programmes through the supply chain (Green Jr et al., 2011). Finally, supplier development helps buying firms to engage their suppliers to eliminate existing deficiencies (Wagner, 2006), and to develop the necessary capability for acting in a sustainable way (Agan et al., 2016; Vachon and Klassen, 2008). Accordingly, Bai and Sarkis (2010) found that supplier sustainability development (SSD) strengthened the relationship between firms and provides a stable supplier base (Beske and Seuring, 2014).

The results showed that most of the papers focused on supplier selection (37 papers) followed by performance assessment (25 papers) and supplier development (11 papers). The combination of these activities was also observed, including performance and development (18 papers), supplier selection and development (14 papers) and supplier selection and performance (7 papers). Twenty-eight papers were about the combination of the three aforementioned supply chain management activities. Most of these papers encompassed environmental sustainability, as can been seen at Figure 2.6.

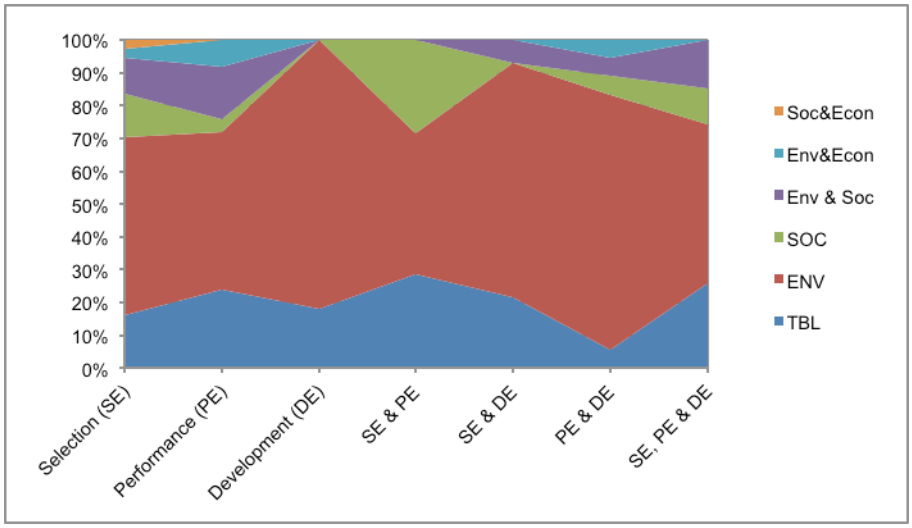


Fig. 2.6: Distribution of the papers reviewed based the supply chain management activities and sustainability dimensions.

In terms of the papers that covered supplier selection, performance and development, triple bottom line and environmental and social sustainability were the centre theme of 14 papers. Seven of them were based on the literature review (Ashby et al., 2012; Beske et al., 2014; Beske and Seuring, 2014; Gold et al., 2010b; Kogg and Mont, 2012; Seuring and Müller, 2008; Tachizawa and Wong, 2014). For instance, Seuring and Müller (2008) is one the first papers that covered a full view of sustainability (triple bottom line - TBL) in supply chain management. They focused on triggers and barriers for SSCM and presented a framework including strategies for suppliers' management of risks and performance and for sustainable products. However, there was less attention given to the role of supply chain management activities in diffusing specific environmental and social sustainability practices. Beske and Seuring (2014) identified five key features of SSCM that were related to supplier selection, performance and development, such as sustainability orientation based on TBL, continuity (long-term relationship, supplier selection and development), collaboration (joint development), risk management (use of standards for selecting suppliers) and proactivity (use of LCA) are key characteristics of SSCM. Four of out 13 papers employed case studies (Forman and Jorgensen, 2004; Koplin et al., 2007; Pagell and Wu, 2009). Automotive, textile and diverse sectors (e.g. paper, food, forest product and cleaning products distributor) were covered by these papers.

Regarding the scope of supply chain, the majority of the papers focused on upstream supply chain (100 papers). The rest focused on both upstream and downstream. In general, product end-of-life management, transportation and warehousing were the main themes covered. In the first theme, more attention was given to reverse logistics (reuse, dismantled and recycling), product recovery, recycling and close-loop supply chain (remanufacturing) (e.g. Beamon, 1999; Beamon and Fernandes, 2004; Chan, 2007; Crotty, 2006; Rizzi et al., 2013; Roy and Whelan, 1992). These papers covered only environmental dimension. The papers on transportation also focused only on the environmental dimension, including practices like energy efficiency (Holt, 2004; Zhu et al., 2008a) and greenhouse gas emission control (Hassini et al., 2012). Regarding transportation, both environmental and social dimension were covered like the design of vehicles to reduce fuel consumption and routing plan (Holt and Ghobadian, 2009) and safety conditions and journey work hours (Ahi and Searcy, 2015).

In conclusion, sustainable supply chain management has a broad scope and integrates environmental and social sustainability in both upstream and downstream supply chain. For that, the supply chain management activities, supplier selection, performance assessment and development are critical. SSCM is also a rapidly developing field, yet there are few publications that empirically integrate these activates.

The next section will present the core definition of the supply chain activities (supplier selection, performance assessment and development) and the sustainability practices will be considered and diffused. Currently these sustainability practices are not well mapped and therefore the mechanisms and conditions for improving and impacting the diffusion of environmental and social practices are unclear. This can allow manufacturers to view examples of good practices and help academics identify areas for future research

2.4.2 Supplier selection and sustainability practices

Supplier selection is a starting point for the supplier relationship and the diffusion of environmental and social sustainability practices. The establishment of minimal requirements and selection based on an evaluation is a way to guarantee that the suppliers act according to a set of standards (Seuring and Müller, 2008).

Buying firms generally transfer to suppliers their sustainability policy, code, or their list of the sustainability requirements (e.g. about product, process, facility, workers) (e.g. Baden et al., 2009; Boyd et al., 2007; Min and Galle, 2001). Communicating the requirements might provide suppliers with awareness or expectation, but might not lead to the implementation of sustainability practices. Crucially, suppliers might comply with the minimum requirements without strong engagement. This suggests a clear barrier to implementation of sustainability practices, such as new environmentally friendly processes or technologies (Caniëls et al., 2013).

To simplify the supplier evaluation process, some firms request that their suppliers have their management system certified by third party companies (e.g. ISO 14001) or other sustainability practices (e.g. eco-label, sustainability reports) (e.g. Beske et al., 2014; Jabbour and Jabbour, 2009). Nevertheless, the sustainability diffusion by buying firms does not really occur in this way, hence suppliers must have the list of sustainability practices in line with the requirements already implemented in order to be selected.

Igarashi et al. (2013) proposed that the requirements for supplier selection should be divided into criteria focused on the product's characteristics and organisation/process. In general, organisation criteria are more commonly adopted to qualify suppliers, while product criteria are used in the final stage of selection. One common point for both products and process is related to the compliance with laws, which covers both environmental and health and safety aspects. Furthermore, Walton et al. (1998) considered that environmental practices could be addressed in the supply chain in a reactive manner (regulation, end-of-pipe technologies), constructive (focus on process) and proactive (new vision and strategies).

Table 2.3 (p. 18) presents the environmental sustainability practices commonly reported as requirements used in the supplier selection. The environmental practices were sorted according to the criteria defined by Igarashi et al. (2013) and Walton et al. (1998). Environmental management system (ISO 14001) and compliance with the environmental regulation were the most frequently mentioned practices. These practices can be associated with risk management (Beske and Seuring, 2014). In some cases, environmental practices are conditional upon the existence of environmental regulation in small and medium enterprises (SMEs) located in developing countries (Ciliberti et al., 2008). In general, it should be noted that most of the practices are related to:

- Management - Control of environmental impact, e.g. packaging standards, environmental policy, environmental management programme, cleaner production);
- Measurement - Environmental report, environmental performance management, Greenhouse gas (GHG) and life cycle assessment (LCA);

• Compliance - practices with are compulsory by law – environmental regulation, level of contaminants (hazardous substances, waste management;

• Standard – Environmental management system (EMS), ISO 14001, eco-labelling; and

• Capability for sustainability - people, technology, resources.

Table 2.3: Environmental practices listed in supplier requirements for selection.

Environmental practices	Classification *		Cita-tions	Some examples of papers
	Igarashi	Walton		
EMS - ISO 14001	Org./Process	Proactive	36	(Lee and Klassen, 2008; Zhu et al., 2012b)
Compliance with regulations	P/O/P	Reactive	17	(Srivastava, 2007; Zhu et al., 2007)
Waste management (source reduction, prevention pollution and disposal) (tracking waste)	Process	Reactive	12	(Carter and Carter, 1998; Lo, 2014)
Level of contaminants Hazardous materials, components or substances	P/P	Reactive	12	(Lamming and Hampson, 1996; Srai et al., 2013)
Packaging – Material, minimizing and Recycling	Product	Construc.	10	(Bowen, 2001; Zsidisin and Siferd, 2001)
Eco-labelling (e.g. Energy star, FSC, ISO 14020)	Products	Proactive	7	(Morali and Searcy, 2013; Walton et al., 1998)
Recyclable materials	Product	Proactive	7	(Côté et al., 2008; Lippmann, 1999)
Environmental report	P/O/P	Construc.	5	(Ciliberti et al., 2008; Preuss, 2001)
Environmental performance management	P/O/P	Construc.	4	(Chen, 2005; Karp, 2005)
Environmental Policy	P/O/P	Proactive	4	(Nawrocka et al., 2009; Rosen et al., 2001)
Carbon footprint	P/P	Proactive	3	(Govindan et al., 2015; Srai et al., 2013)
Energy source or low energy consumption	Process	Proactive	3	(Blome et al., 2014a; Holt, 2004)
Take back programme in accordance with regulation	P/P	Reactive	3	(Holt, 2004; Holt and Ghobadian, 2009)
Cleaner production	P/O/P	Proactive	2	(Agan et al., 2016; Govindan et al., 2015)
Environmental management programme	P/O/P	Proactive	2	(Darnall et al., 2008; Forman and Jorgensen, 2004)
Recyclable pallet	Process	Proactive	2	(Holt, 2004; Holt and Ghobadian, 2009)
Renewable resource	Process	Proactive	2	(Brandenburg et al., 2014; Hassini et al., 2012)
Evaluation of the second tier supplier	P/O/P	Proactive	1	(Igarashi et al., 2013)
GHG management - measurement and reduction	P/P	Proactive	1	(Harms et al., 2013)
Green technologies	Process	Proactive	1	(Igarashi et al., 2013)
Life cycle assessment	P/P	Proactive	1	(Jabbour and Jabbour, 2009)
Staff training	Org.	Proactive	1	(Igarashi et al., 2013)
Water footprint	P/P	Proactive	1	(Kogg and Mont, 2012)

* Based on Igarashi et al. (2013) and Walton et al. (1998)
Construc. – constructive
P/O/P – Product/Organisation/Process P/P Product/Process

In terms of social sustainability practices, typical practices reported were human rights and work conditions (Table 2.4, p. 19). The social practices were also classified according to their purpose (e.g. compliance, management,

standard, measurement and capability. In general, these practices related to the supplier facilities and labour aspects. The human rights most cited were child labour, freedom of association, forced labour, discrimination and diversity (Baden et al., 2009; Elg and Hultman, 2011). Ageron et al. (2012) stated that measurement for health and safety issues is a compulsory starting point for supplier selection. This was the key sustainability practice related to working conditions, followed by wages calculation (in line with local regulations and taking in consideration compensation and maximum working hours) (Polgreen, 2002) and human resource development (education, skills). Some studies have also reported the use of standards and certification, such as for social environmental system (SA 8000) and for control of health and security in industrial sites (OHSAS 18001) (Okongwu et al., 2013). SA 8000 is one the most frequently mentioned practices and associated with the reduction of information asymmetry (Ciliberti et al., 2009). However, the adoption of these practices has been more common in large and multinational companies (Ayuso et al., 2013).

Table 2.4: Environmental practices listed in supplier requirements for selection.

Social practices	Focus	Citations	Some examples of papers
Human rights	Compliance	13	(Ashby et al., 2012; Koplin et al., 2007)
Implementation of a code of Conduct	Compliance	8	(Ciliberti et al., 2009; Elg and Hultman, 2011)
Working conditions - Health and safety	Compliance	8	(Baden et al., 2009; Sharfman et al., 2009)
SA 8000	Standards	7	(Klassen and Vereecke, 2012; Polgreen, 2002)
Working conditions - Wage calculation	Compliance	4	(Elg and Hultman, 2011; Polgreen, 2002)
Compliance with regulation	Compliance	3	(Boyd et al., 2007; Leppelt et al., 2013)
Communicate the code of conduct upstream in the supply chain	Management	3	(Boyd et al., 2007; Lippmann, 1999)
Community (Projects, investments)	Management	3	(Ashby et al., 2012; Klassen and Vereecke, 2012)
Working conditions - Human resource development	Capability	3	(Elg and Hultman, 2011; Klassen and Vereecke, 2012)
Fair trade	Standards	1	(Ashby et al., 2012)
GRI	Measurement	1	(Srai et al., 2013)
ILO	Standards	1	(Polgreen, 2002)
United Nation Global Compact	Standards	1	(Morali and Searcy, 2013)

Suppliers' evaluation against the selected requirements is also frequently conducted and transactional contract ensures the implementation of the sustainability practices by suppliers (Jira and Toffel, 2013). Accordingly, the supplier evaluation and formalisation are mechanisms frequently used by buying firms to enforce suppliers to implement sustainability practices (Lippmann, 1999). In this case, buyers can clearly exercise the diffusion of sustainability practices.

The most common mechanisms used to evaluate suppliers were 2nd party audits (conducted by the buyer) followed by 3rd party audits (independent firm) and self-evaluation (figure 2.7, p. 20). Audits are recognised as a systematically reliable tool for control of compliance and basic environmental management (Nawrocka et al., 2009) and can reduce the risk to the buying firm from

suppliers (Handfield et al., 2005). However, the lack of resources limits the application in supplier selection, so it has been applied more commonly within strategic suppliers in long term relationships (Nawrocka et al., 2009). In general the evaluation mechanism focused on compliance with regulation and requirements (Ayuso et al., 2013), risk (Beske et al., 2014), capability (Paulraj, 2011), process and facility (Elg and Hultman, 2011).

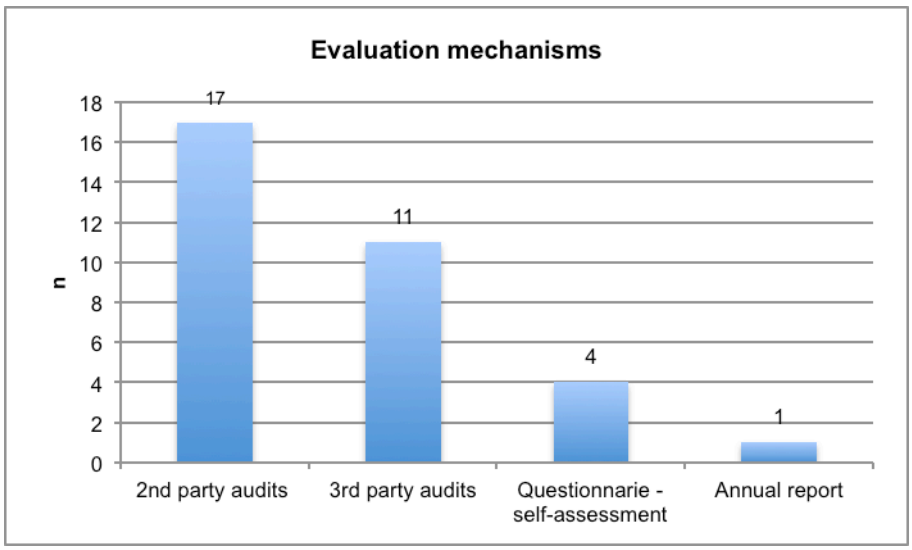


Fig. 2.7: Supplier evaluation mechanisms.

2.4.3 Supplier performance assessment and sustainability practices

Supplier sustainability performance assessment includes activities of gathering and processing supplier information (Vachon and Klassen, 2006). This mostly focuses on measuring how well suppliers comply with regulations and requirements (compliance/risk) (60 papers mentioned this purpose) (e.g. Beske and Seuring, 2014; Rosen et al., 2001). Improvements in sustainability performance (32 papers) (e.g. Nagel, 2003; Schaltegger and Burritt, 2014), life cycle perspective (employment of analytical tools like LCA, carbon footprint, material flow analysis) (28 papers) (e.g. Ahi and Searcy, 2015; Nakano and Hirao, 2011) and improvements in products (13 papers) (e.g. Handfield et al., 2005; Vachon and Klassen, 2008) were also performance assessment purpose observed.

Different performance mechanisms have been observed, which arise from self-assessment (Klassen and Vereecke, 2012), surveys (Nawrocka et al., 2009) and audits (Morali and Searcy, 2012) (Table 2.5). Second party audits were the most widely used for monitoring compliance/risk and improving the overall sustainability performance. It is important to note that the own buying firm team conducts 2nd party audits what promotes more interaction with suppliers. Third party audits, self-assessment and following-up suppliers were also commonly adopted (Beske-Janssen et al., 2015; Chardine-Baumann and Botta-Genoulaz, 2014; Marshall et al., 2015). Interestingly, some online platforms include a scoring of suppliers indicating their compliance level and all materials used within the current production process (e.g. Crotty, 2006; Kogg

and Mont, 2012). This allows buying firms to quickly assess the compliance performance of their suppliers.

Most suppliers are typically assessed on compliance with the selected sustainability requirements through self-assessment or audits (Gold et al., 2010). On the other hand, strategic suppliers usually receive more attention in performance with focus on their performance improvements (Nawrocka et al., 2009) or products improvement through life cycle perspective approaches (e.g. LCA) (Ashby et al., 2012; Schaltegger and Burritt, 2014). When the performance purpose were improvements in the product and life cycle management, the use of LCA were broadly employed (e.g. Hutchins and Sutherland, 2008; Michelsen, 2006; Nakano and Hirao, 2011) as can be seen observed in Table 2.5.

Table 2.5: Performance mechanism according to the purpose of supplier performance assessment.

Performance mechanisms employed	**Purpose of performance assessment**				***Total***
	Compliance / Risk	**Improvements in performance**	**Lifecycle perspective**	**Improvements in product**	
2nd party audit	18	9	4	2	*33*
3rd party audit	13	6	2	0	*21*
LCA	0	4	13	4	*21*
Follow-up certification	4	2	3	2	*11*
Self-assessment	7	2	0	2	*11*
Carbon footprint	2	2	2	1	*7*
NGO	3	3	1	0	*7*
Survey	4	1	0	1	*6*
Platforms	3	1	1	0	*5*
Score-cards	3	1	0	1	*5*
Material flow analysis	2	0	1	0	*3*
Water footprint	1	1	1	0	*3*
Total	*60*	*32*	*28*	*13*	-

Table 2.6 (p. 22) presents the environmental practices measured in supplier performance assessment. The most mentioned environmental practices were energy management (e.g. consumption of electricity, fuel and gas, efficiency, renewable source, product recovery), followed by carbon management (direct and indirect emission, control, reduction plan, disclosure information, GHG, air pollution) and waste management (measure streams, disposal, reduction). Overall, the environmental practices measured were related to compliance and improvements in the general sustainability performance. Table 2.7 (p. 23) points out the social practices. The most measured practices were human rights, working conditions and health and safety conditions. Interestingly, most of the practices measured were also considered as requirements adopted to select suppliers.

Table 2.6: Environmental practices measured in supplier performance assessment.

Environmental practices measured	Purpose	Cita-tions	Some examples of papers
Energy management	C / P / LC	21	(Beamon, 1999; Gimenez and Tachizawa, 2012)
Carbon management (direct and indirect emission, control, reduction plan, disclosure information, GHG, air pollution)	ALL	21	(Ageron et al., 2012; Jira and Toffel, 2013)
Waste management	ALL	19	(Meacham et al., 2013; Schaltegger and Burritt, 2014)
Compliance with regulations	ALL	16	(Bakker and Nijhof, 2002; Gold et al., 2010a)
Material intensity	C / P / LC	14	(Mcintyre et al., 1998; Salvá et al., 2013)
Hazardous substances use	ALL	14	(Handfield et al., 2005; Shaw et al., 2010)
Environmental management system / ISO 14001	C / P / LC	12	(Ahi and Searcy, 2015; Tachizawa and Wong, 2014)
Wastewater	P / LC	7	(Gimenez and Tachizawa, 2012; Hervani et al., 2005)
Resource (transparency and inventory)	C / P / LC	6	(Dües et al., 2013; Shaw et al., 2010)
Waste Packaging	ALL	5	(Nagel, 2003; Okongwu et al., 2013)
Recycling	ALL	5	(Ahi and Searcy, 2015; Handfield et al., 2005)
Environmental policy	C	4	(Dou et al., 2014b; Salvá et al., 2013)
Transportation - efficiency, fuel consumption, miles travelled	LC	4	(Ahi and Searcy, 2015; Shaw et al., 2010)
Compliance with requirements	ALL	3	(Beske and Seuring, 2014; Rosen et al., 2001)
Packaging (volume and materials)	C / P	3	(Nagel, 2003; Okongwu et al., 2013)
Biodiversity conservation	C / P	3	(Chardine-Baumann and Botta-Genoulaz, 2014; Shaw et al., 2010)
Number of regulatory violations	C	2	(Ahi and Searcy, 2015; Hervani et al., 2005)
Number of environmental accidents	C	2	(Ahi and Searcy, 2015; Hervani et al., 2005)
Costs of environmental management (e.g. compliance and control and management)	P / LC	2	(Chardine-Baumann and Botta-Genoulaz, 2014; Hervani et al., 2005)
Internal protocol - control and management, e.g. identify environmental aspects & regulations	C / P	2	(Dou et al., 2014b; Rock et al., 2006)
Recycled materials	C / LC	2	(Beamon, 1999; Chardine-Baumann and Botta-Genoulaz, 2014)
Recycled water	C / P	2	(Chardine-Baumann and Botta-Genoulaz, 2014; Dou et al., 2014b)
Soil degradation - land pollution	C / P	2	(Chardine-Baumann and Botta-Genoulaz, 2014; Okongwu et al., 2013)
Pollution prevention	C / LC	2	
Eco-systemic services	C / P	2	(Chardine-Baumann and Botta-Genoulaz, 2014; Okongwu et al., 2013)
Functions with environmental responsibilities	P	1	(Hervani et al., 2005)
Capability	P	1	(Akman, 2015)
Re-usable pallets	C / P	1	(Okongwu et al., 2013)
Hazardous wastes	C / P	1	(Rock et al., 2006)
Volatile organic materials emissions	C / P	1	(Rock et al., 2006)
Noise pollution	C / P	1	(Okongwu et al., 2013)
Development of urban and rural areas	P	1	(Chardine-Baumann and Botta-Genoulaz, 2014)

ALL – Compliance/Risk, Improvements in performance, Lifecycle perspective & improvements in products / **C –** Compliance/Risk / **C/LC –** Compliance/Risk & Lifecycle perspective / **C/P –** Compliance/Risk & Improvements in performance / **C/P/LC–** Compliance/Risk, Improvements in performance & Lifecycle perspective / **P –** Improvements in performance

Table 2.7: Social practices measured in supplier performance assessment.

Social practices measured	Purpose	Cita-tions	Some examples of papers
Human rights	ALL	9	(Hutchins and Sutherland, 2008; Okongwu et al., 2013)
Working conditions	ALL	8	(Chardine-Baumann and Botta-Genoulaz, 2014; Pagell and Wu, 2009)
Health and safety	C / P / LC	7	(Ahi and Searcy, 2015; Porteous et al., 2015)
SA 8000	C / P	4	(Beske-Janssen et al., 2015; Hollos et al., 2012)
Community (Projects, investments)	P	4	(Hollos et al., 2012; Okongwu et al., 2013)
Compliance with regulation	C	4	(Lee and Kim, 2011; Marshall et al., 2015)
Local jobs - jobs opportunity	C / P	4	(Ahi and Searcy, 2015; Beske-Janssen et al., 2015)
Human resource development - Education - qualification, skills	C / P	3	(Chardine-Baumann and Botta-Genoulaz, 2014; Porteous et al., 2015)
OHSAS 18001	C / P	2	(Hollos et al., 2012; Okongwu et al., 2013)
Wages and working hours (including overtime)	C	2	(Hutchins and Sutherland, 2008; Porteous et al., 2015)
Community complaints	C	2	(Beske-Janssen et al., 2015; Hervani et al., 2005)
Corruption/bribery	C / P	2	(Chardine-Baumann and Botta-Genoulaz, 2014; Okongwu et al., 2013)
Formal joint health and safety committees	C	1	(Wang and Sarkis, 2013)
Adult literacy	P	1	(Hutchins and Sutherland, 2008)
Healthcare	P	1	(Hutchins and Sutherland, 2008)
Philanthropy	P	1	(Hutchins and Sutherland, 2008)
Return on equity	P	1	(Brandenburg et al., 2014)
Product safety	P	1	(Varsei et al., 2014)
Fight against corruption	P	1	(Chardine-Baumann and Botta-Genoulaz, 2014)
Fair trade	P	1	(Chardine-Baumann and Botta-Genoulaz, 2014)
ALL – Compliance/Risk, Improvements in performance, Lifecycle perspective & improvements in products / **C –** Compliance/Risk / **C/P –** Compliance/Risk & Improvements in performance / **C/P/LC –** Compliance/Risk, Improvements in performance & Lifecycle perspective / **P –** Improvements in performance			

There is also an effort to assess if sustainability practices affect the overall performance of the buying firms (e.g. Bowen, 2001; Golicic and Smith, 2013; Hollos et al., 2012; Testa and Iraldo, 2010; Vachon and Klassen, 2008; Wang and Sarkis, 2013). Different results could be found in terms of cost reduction, risk management and improvements in overall performance. For example, Green Jr et al. (2011) found that environmental collaboration (mutual understanding of the responsibility regarding environmental performance, achievement of environmental goals collectively) and monitoring practices among suppliers affect the environmental and organisational performance. Alternatively, Hollos et al. (2012a) found that environmental collaboration (feedback, monitoring environmental and social standards, joint planning activities) did not affect economic performance. However, while the diffusion of environmental sustainability practices (e.g. Design for environmental, investment in recovery and cooperation with supplier for the environment) had a positive effect in both operational and economic performance (Zhu et al.,

2012a), social responsibility practices (e.g. working conditions, certified labour standard and certified safety standard) did not. Testa and Iraldo (2010) proved that the focal company's environmental performance can be improved by making requests to suppliers to meet a given performance and involving them in some initiatives. Evidence provided across the literature is not sufficient to state if one specific sustainability practice or a set of them can improve the performance of a buyer, hence these practices are requested or diffused in a different context.

2.4.3 Supplier development and sustainability practices

Supplier development is a process of internalization of buying firms sustainability practices across its suppliers (Vachon and Klassen, 2006). Bai and Sarkis (2010) considered supplier development as a critical activity within supply chain management and also necessary for effective green supply chain management.

Different supplier development purposes were identified in the literature. Figure 2.98 illustrates the distribution of the main purpose of supplier sustainability development mentioned in the papers reviewed. The main purposes mentioned were meeting compliance (e.g. Caniëls et al., 2013; Forman and Jorgensen, 2004) and improving performance (e.g. Sancha et al., 2015; Wong et al., 2015).

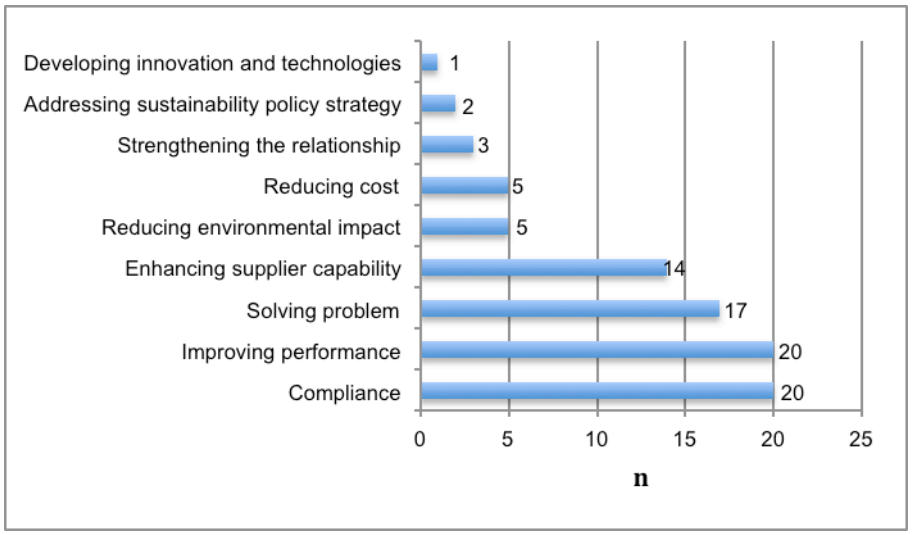


Fig. 2.8: Supplier sustainability development purpose.

Ensuring that suppliers comply with the requirements is a way to mitigate operational risks that can disrupt supply lines, increase costs or depress revenues (Klassen and Vereecke, 2012). Supplier sustainability development is also oriented towards the achievement of environmental and social goals, including solving problems (e.g. Holt and Ghobadian, 2009; Tong et al., 2012), developing supplier capability for sustainability (Agan et al., 2016; Vachon and Klassen, 2008), reducing environmental impact (e.g. Dou et al., 2014b; Handfield et al., 2005) and cost (e.g. Agan et al., 2016; Noshad and Awasthi, 2015). Finally, strengthening the relationship (e.g. Bai and Sarkis, 2010;

Noshad and Awasthi, 2015), addressing sustainability strategies (e.g. carbon management) (Beske and Seuring, 2014; Lee and Cheong, 2011) and co-development of innovation and technologies (Ehrgott et al., 2013) were also observed.

The definition of supplier development initiatives is critical for diffusion of sustainability practices; hence it is associated with the way that the buying firm develops their suppliers to achieve the development purpose. Bai and Sarkis (2010) categorised green supplier development initiatives into three groups, namely green knowledge transfer and communication, investment and resource transfer, and management and organisational practices. The first category incorporated training, awareness and advisers regarding environmental issues for suppliers. Investments in supplier capability, process and alternatives for reducing environmental cost as well as integration between suppliers and focal firm's employees were included in the second category. Finally, management organisational practices were buying firms' internal capability, implementation of practices and integration with suppliers in eco-design stage.

Based on this categorisation the papers that covered supplier development were reviewed. Several papers followed Bai and Sarkis' categorisation (e.g Agan et al., 2016; Ehrgott et al., 2013; Tate et al., 2012; Trapp and Sarkis, 2016). However, new development initiatives were found and they did not fit Bai and Sarkis' categorisation. In this sense, a new supplier sustainability development initiative classification was proposed, covering four groups of initiatives, namely:

- Sharing knowledge (32 papers were sorted in this category): this is associated with educating (training), informal transferring knowledge (e.g. email exchanges), technical support and assistance and personal transfer (transferring employees - buyers to suppliers or vice versa).
- Joint initiatives (28 papers): buying firms and suppliers work together to achieve sustainability objectives (e.g. carbon management), redesign products/components, solving problems and developing innovation and technologies.
- Incentives (11 papers): suppliers are encouraging the improvements of their sustainability performance by using long-term contracts and awards (annual supplier conference and prises). The outcomes of the supplier performance assessment are critical for this category.
- Investments (7 papers): direct capital invested in supplier's facilities, including equipment, technologies, standards and capabilities.

It is important to note that in the first three categories the major source of effort comes from the buying firm (e.g. investment). In the last one, there is a more symmetrical effort between the buying firm and its suppliers. For instance, a clear definition of responsibility and resources are considered. According to Rosen et al. (2001) reciprocal effort is a success factor for long-term relationship.

Prior literature has focused on the priorisation of the development initiatives by using decision support tools, such as analytical hierarchy process, but without a clear connection with the supplier development purpose (Bai and Sarkis, 2010; Dou et al., 2014b; Fu et al., 2012). Likewise, based on the papers

reviewed a link between the supplier sustainability development initiatives commonly adopted by buying firms to diffuse sustainability practices and the development purpose is provided in Table 2.8. For instance, both sharing knowledge initiatives and joint initiatives are effective to meet compliance or improve performance (e.g. Ehrgott et al., 2013; Forman and Jorgensen, 2004; Klassen and Vachon, 2003). Enhancing capability is mostly achieved through the development of sharing knowledge and incentives (e.g. Caniëls et al., 2013; Rosen et al., 2001). Investments are critical for strengthening the relationship (e.g. Bai and Sarkis, 2010; Pagell and Wu, 2009).

Table 2.8: Supplier sustainability development purpose vs. initiatives.

Development initiatives	**Purpose of supplier development initiatives**									**Some examples of papers**
	CO	**PE**	**PR**	**CA**	**IM**	**CO**	**RE**	**ST**	**TE**	
Sharing knowledge	High	High	High	High	High	High	Medium	Low	Low	(Gimenez and Tachizawa, 2012; Simpson and Power, 2005)
Joint initiatives	High	High	High	Medium	Low	Low	Low	Low	High	(Tachizawa and Wong, 2014; Tong et al., 2012)
Incentives	High	High	High	High	Low	Medium	Medium	-	-	(Blome et al., 2014a; Caniëls et al., 2013)
Investments	High	High	High	Medium	Medium	Medium	High	-	-	(Ashby et al., 2012; Pagell and Wu, 2009)
CO – Compliance, **PE** – Improving performance, **PR –** Solving problem, **CA** – Enhancing supplier capability, **IM –** Reducing environmental impact, **CO –** Reducing cost, **RE –** Strengthening the relationship, **ST** – Addressing sustainability policy strategy, **TE –** Developing innovation and technologies.										
Criteria: High – above the average and median of papers that mentioned the initiative and purpose of the supplier development initiative, Medium – Below average and above and Low – below the average and median.										

In general, there are a broad range of initiatives that can be employed in line with the development purpose. Conversely, not all the initiatives might contribute to achieve the purpose or they may be less influential. It is crucial therefore that buying firms make this link between the purpose and the mechanisms for supplier sustainability development.

Table 2.9 (p. 27) presents the environmental practices diffused through supplier development initiatives. The most common practices diffused were supporing suppliers to implement performance measurement and improvements. This practice was diffused by both development initiatives, i.e. sharing knowledge, joint initiatives, incentives and investments. Interestingly, compliance with regulations and development of environmental programmes were diffused only through sharing knowledge initiatives (e.g. training), whereas package improvement was by joint initiatives.

Less social sustainability practices were found (Table 2.10, p. 27). Health and safety condition and the implementation of code of conduct were the practices more mentioned. In common, these practices were diffused by sharring knowledge and joint initiatives. It was not evident the use of investment to diffuse social practices through development initiatives.

Table 2.9: Environmental practices diffused through supplier development.

Environmental practices diffused	Cita-tion	Development initiative employed to diffuse				Some examples of papers
		SK	JI	INC	INV	
Environmental performance measurement and improvements	25	Yes	Yes	Yes	Yes	(Govindan et al., 2013; Simpson and Power, 2005)
Design for environment	14	Yes	Yes	Yes	Yes	(Sarkis et al., 2011; Sharfman et al., 2009)
Clean production & Pollution prevention (Waste water reduction, solid waste reduction)	11	Yes	Yes	Yes	Yes	(Blome et al., 2014b; Zhu et al., 2007)
EMS – ISO 14001	9	Yes	Yes	Yes	Yes	(Gallear et al., 2012; Green Jr et al., 2012)
Reduce hazards releases on the environment (hazard management, reduction of the consumption)	9	Yes	Yes	Yes	Yes	(Handfield et al., 2005; Vachon and Klassen, 2008)
Reverse Logistics (Recycling, remanufacturing or disposal) and waste management	9	Yes	Yes	Yes	Yes	(Chan, 2007; Roy and Whelan, 1992)
Improving energy efficiency	4	Yes	Yes	Yes	Yes	(Rosen et al., 2001; Zhu et al., 2008)
Supplier process change /Environmental-friendly production	4	Yes	Yes	Yes	NE	(Agan et al., 2016; Caniëls et al., 2013)
Package improvements	3	NE	Yes	NE	NE	(Blome et al., 2014b; Gold et al., 2010b)
Using less incoming materials	3	Yes	Yes	Yes	Yes	(Lippmann, 1999; Tachizawa et al., 2012)
Carbon emission reduction performance - direct or indirect carbon emission	2	Yes	Yes	Yes	Yes	(Ashby et al., 2012; Beske and Seuring, 2014)
Eco-labelling (e.g. Energy Star, Blue Angel)	2	Yes	Yes	NE	NE	(Forman, M.; Jorgensen, 2004; Trapp and Sarkis, 2016)
Meet legal and *regulation compliance* - environmental	1	Yes	NE	NE	NE	(Lee and Klassen, 2008)
Lean manufacturing	1	Yes	Yes	Yes	NE	(Noshad and Awasthi, 2015)
Development of environmental programmes	1	Yes	NE	NE	NE	(Klassen and Vachon, 2003)
LCA	1	Yes	Yes	Yes	Yes	(Bai and Sarkis, 2010)
Reducing water consumption	1	Yes	Yes	Yes	Yes	(Trapp and Sarkis, 2016)
Close-loop supply chain management	1	NE	NE	NE	Yes	(Ashby et al., 2012)
Return of products	1	Yes	Yes	NE	NE	(Holt and Ghobadian, 2009)

Table 2.10: Social practices diffused through supplier development.

Environmental practices diffused	Cita-tion	Development initiative employed to diffuse				Some examples of papers
		SK	JI	INC	INV	
Health & safety	3	Yes	Yes	Yes	NE	(Agan et al., 2016; Noshad and Awasthi, 2015)
Implementation of code of conduct	2	Yes	Yes	NE	NE	(Harms et al., 2013; Sancha et al., 2015)
Meet legal and regulation compliance - H&S issues	1	Yes	NE	NE	NE	(Lee and Klassen, 2008)
SA 8000	1	Yes	Yes	NE	NE	(Sancha et al., 2015)
Working conditions	1	Yes	Yes	Yes	NE	(Agan et al., 2016)
Adult literacy	1	Yes	Yes	Yes	NE	(Agan et al., 2016)
Women's healthcare and education	1	Yes	Yes	NE	NE	(Sancha et al., 2015)
Human right	1	Yes	Yes	Yes	NE	(Agan et al., 2016)

2.5 SUMMARY OF THE CHAPTER

2.5.1 Summary of findings

This chapter has examined research works related to the diffusion of environmental and social sustainability practices across the supply chain. The diversity of activities involved as well as inter-organisational processes in supply chain management makes the diffusion of sustainability practices complex. The body of literature analysed on environmental and social sustainability practices across the supply chain management is still a young field and rapidly emerging, especially considering that 60% of the papers studied appeared in the last five year.

Addressing the RQ1 the thematic analysis revealed that the diffusion of sustainability practices between buying firms and suppliers were most influenced by the activities of supplier selection, supplier performance assessment and supplier development. In spite of the significant body of literature on SSCM, there is an absence of theory to explain how environmental as well as social sustainability practices diffuse in the supplier base as a result of integration of the three aforementioned activities. This gap will be covered in the next topic, which addresses the need of a conceptual framework for diffusion of sustainability practices across the supply chain.

Tables 2.3, 2.4, 2.6, 2.7, 2.9 and 2.10 presented the environmental and social sustainability practices considered in the supplier selection, performance and development in order to answer the RQ2. Forty environmental practices and 25 social practices were diffused through the three aforementioned supply management activities. More emphasis has been given to environmental sustainability practice diffusion but there is a lack of clarity on the conditions required or how to address both environmental and social sustainability. Compliance with regulation (environmental, working condition, health and safety), standards (e.g. ISO 14001 and SA8000), energy management, waste management, packaging (specifications and improvements) were practices commonly used in the supplier selection, measured in the performance assessment and diffused by development initiatives. In general, both performance assessment and development mostly focused on compliance and improvements in performance. Audits and sharing knowledge initiatives were the mechanisms and initiatives frequently used in performance and development. Moreover, evidence suggested that more attention has been paid to engage key first tier suppliers leaving a lack of understanding of the diffusion across different tiers.

The academic contribution to knowledge of this analysis has been to provide an understanding of how both environmental and social sustainability practices are considered by supply chain management activities to engage suppliers and improve their compliance and performance.

2.5.2 Further conceptual investigation on diffusion of environmental and social sustainability practices

Despite the growth in the body of SSCM knowledge it is still difficult to understand the effect of supply chain activities in engaging suppliers in order to

diffuse sustainability practices. Actually, there is little knowledge about organisational factors related to supplier selection, performance assessment and development that enhance the diffusion of sustainability practices across the supplier base. For instance, less attention has been paid to understanding organisational factors which impact the design and implementation of the sustainability requirements and, in turn, sustainability practices diffusion. How sustainability practices are currently used as a list of the sustainability requirements (e.g. Govindan et al., 2015; Igarashi et al., 2013; Jabbour and Jabbour, 2009) and the triggers for that (e.g. Ayuso et al., 2013; Grimm et al., 2014; Rock et al., 2006) have been addressed further in the literature.

Beske-Janssen et al. (2015) stated that the literature is not clear about the responsibility for coordinating the supply chain performance assessment (i.e. if the role of supply chain performance sustainability needs to be assumed by the focal firm or any other supplier or external agent - e.g. government). Studies on which functions (departments) would be responsible for designing and monitoring the performance measures was a gap identified by Hervani et al., (2005). Likewise, a better understanding on organisational factors that enhance the diffusion of sustainability practices through supplier performance assessment is also needed.

Sustainable supply chain management literature is also scant on organisational factors that affect the diffusion of both environmental and social sustainability practices through supplier development. Actually, as seen early in this chapter, fewer papers were found regarding supplier development compared with supplier selection and performance assessment. Recent evidence suggests supplier integration is a factor for supplier development (Sancha et al., 2015). The authors included, as supplier integration elements, the existence of communication system, sharing information, previous experience in making joint decisions regarding product design or quality improvements. Therefore, the factors that affect the employment of supplier sustainability development initiatives have been given limited coverage in the literature. Bai and Sarkis (2010), one of the first papers that covered development initiatives, argued that there was a gap in the research on how buyers could effectivelly manage supplier development initiatives. Moreover, a recent literature review conducted by Noshad and Awasthi (2015) highlighted the importance of future research which adressed the necessary ingredients for developing suppliers.

Driven by these gaps, a conceptual framework is proposed in the next chapter attempting to develop a theory on sustainability diffusion. The framework will focus on the role of the manufacturing buying firms in the diffusion of sustainability practices across their supplier base and addresses in general two novel features. Firstly, the integration of supply chain management activities is considered in order to enhance the diffusion of both environmental and social sustainability practices. This interdisciplinary link is studied by capturing organisational factors that influence the diffusion of sustainability practices. Therefore, the second novelty is the extent of organisational factors, which aids the manufacturing buying firm to drive the sustainability diffusion across their supplier base.

CHAPTER 3

Conceptual Framework for Diffusion of Sustainability Practices

3.1 INTRODUCTION

This chapter presents a conceptual framework for diffusion of sustainability practices across the supplier base. A conceptual framework covers, either graphically or in narrative form, the main things to be studied, including the key factors, variables, or constructs (Miles et al., 2014). Jabareen (2009) considered that conceptual framework provided an interpretative approach for reality, i.e. an understanding, instead of a casual/analytical setting. Moreover, it can be designed through a process of qualitative analysis (Jabareen, 2009).

Likewise, the framework is developed directly from the clusters of organisational factors aligned to the supply management activities identified in the systematic literature review, namely supplier selection, supplier performance assessment and supplier development. Organisational factors are considered to be the elements that facilitate internal actions of the buying firm and of suppliers to coordinate the information exchanges, build and transfer knowledge, resource and technologies related to sustainability (Grimm et al., 2014; Sancha et al., 2015).

The 140 papers examined in the systematic literature review revealed 36 factors that are influential in diffusing practices from the buyer to the supplier. These factors form the conceptual framework which focuses on the role of buying manufacturing firms in the diffusion of sustainability practices across their supplier base. There is a distinct split within the factors listed as to whether they are applied to the design or the implementation activity (Sections 3.2, 3.3 and 3.4). Furthermore, the factors identified were further classified by analysis whether they were influential for considering and diffusing environmental and social practices. The papers that support the factors were also examined in terms of their empirical rigour by employing methodology (e.g. conceptual papers – e.g. literature review and empirical papers – e.g. case study and survey), as well as noting the frequency of citations of the papers. It is important to note that elements were not used as an exclusion criterion or to sort the level of importance of the factors (prioritisation).

This depicts patterns in the factors and points out the most critical variables influencing the diffusion of sustainability practices. This provides a foundation by which the diffusion of environmental and social sustainability practices occurs. Each of these can be sub-divided according to whether they relate to the process of design or the process of implementation.

This chapter therefore addresses the research questions RQ1 and RQ3:

(RQ1) How are environmental and social sustainability practices diffused across the supplier base?

(RQ3) What are the influential organisational factors in the supply chain management activities for diffusion of environmental and social sustainability practices?

3.2 SUSTAINABILITY DIFFUSION THROUGH SUPPLIER SELECTION

Buying firms generally transfer to suppliers their list of the sustainability requirements (e.g. about product, process, facility, workers) (e.g. Baden et al., 2009; Boyd et al., 2007; Min and Galle, 2001). Communicating the requirements might provide suppliers with awareness or expectation, but might not lead to the implementation of sustainability practices. Suppliers' evaluation against the selected requirements is also frequently conducted and a transactional contract ensures the implementation of the sustainability practices by suppliers (Jira and Toffel, 2013). Accordingly, the supplier evaluation and formalisation are mechanisms frequently used by buying firms to enforce suppliers to implement sustainability practices (Lippmann, 1999). In this case, buyers can clearly exercise the diffusion of sustainability practices.

Likewise, this first part of the proposed framework provides organisational factors related to the design and implementation of sustainability requirements. The implementation of the sustainability requirement occurs by communicating these to suppliers, evaluating suppliers against the requirements and then formalisation of the relationship.

3.2.1 Design of sustainability requirements

Prior research literature has identified that buying firms usually communicate to suppliers their sustainability policy or code as supplier's selection requirements or as guidelines or as a statement of expectations regarding the supplier's sustainability behaviour (Boyd et al., 2007; Schleper and Busse, 2013). Specific sustainability requirements need to be drawn, hence they provide a base for characterising the supplier base and constructive dialogue (Lamming and Hampson, 1996). However, a poorly developed set of specifications to the supplier can increase transactional cost and behavioural uncertainty, and be a barrier in verifying the supplier compliance with them (Simpson and Power, 2005).

A starting point for considering sustainability across the SCM activities is gaining an understanding of the firm's sustainability policies and strategies (Igarashi et al., 2013). The design of the selected sustainability requirements might acknowledge strategic documents, such as environmental policy or mission (Lippmann, 1999; Min and Galle, 2001), code of conduct (Ciliberti et al., 2009), policy on green logistics (Holt, 2004). Buying firms should also provide a clear vision of sustainability to their suppliers and customers (Ahi and Searcy, 2013; Koplin et al., 2007; Morali and Searcy, 2013; Nawrocka et al., 2009; Rock et al., 2006). Based on that, the first two organisational factors considered in the framework are buying firm's sustainability policy and strategy (OF1) and providing a clear meaning of sustainability (OF2).

The importance of involvement and support of senior managers responsible for key interfaces with suppliers to diffuse sustainability practices was also evident (e.g. Zhu et al., 2008). Moreover, cross-functional integration, which usually occurs through teams that include representatives of supply chain related functional areas (Lippmann, 1999), allows increase visibility of the flows

and reliability of decisions making (Pereira et al., 2014). This integration also provides deep understanding of the products and/or components in terms of their environmental characteristics/risk and social risk (Lippmann, 1999; Preuss, 2001; Tong et al., 2012). Therefore, support of top and middle managers (OF3), cross-functional integration (OF4) and understanding environmental and social risk (OF5) complemented those factors uncovered so far.

Engagement of external stakeholders was also uncovered in the design requirements. Here, engagement of external stakeholders (OF6) is considered as the actor, which is external to the relationship between the buying firm and suppliers, such as NGO, government, third party firms and independent platforms (e.g. Darnall et al., 2008; Kogg and Mont, 2012). Schleper and Busse (2013) justified the stakeholder engagement to ensure legitimacy of the requirement design.

The use of industry code/guideline/principles/initiatives (OF7) was also uncovered. This included ILO, Responsible Care Initiative, Fair trade and United Nation Global Compact (e.g. Ashby et al., 2012; Klassen and Vereecke, 2012; Polgreen, 2002).

Igarashi et al. (2013) stated that buyers needed to commit themselves with the selected requirements and use them convincingly to select suppliers. Inconsistency between what the buyer requests and what it does can lead to lower perception by suppliers to adopt sustainability practices (Boyd et al., 2007). Therefore, internal implementation of the sustainability practices (included in the requirements) by buying firms is included (OF8).

Finally, Schleper and Busse (2013) argued that the sustainability requirements needed to be designed, considering how they can be measured, i.e. the suppliers' compliance with the sustainability practices stated. Indeed, the establishment of minimal requirements and evaluation is a way to guarantee that the suppliers act in line with a set of standards, mitigating risk, such as products free of contamination (Seuring and Müller, 2008). Likewise, the sustainability requirements need to provide a basis for measuring the supplier's compliance (OF9).

Table 3.1 (p. 34) presents the organisational factors that dominate the design of sustainability requirements for supplier selection. These factors were influential for diffusion for considering both environmental and social sustainability practices. The exception is OF6 – engagement of stakeholders, which was supported by papers that considered only social practices. The table was not organised according to the frequency, but following a logical sequence.

Table 3.1: Influential organisational factors for considering environmental and social practices in the design of sustainability requirements.

Organisational factors	Practices		Empirical rigour		Citation	References
	Env	Soc	Empirical	Concep.		
Buying firm's sustainability policy and strategy (2020 sustainability Plan) (OF1)	X	X	Both	Both	14	(Ciliberti et al., 2009, 2008; Gold et al., 2010b; Holt, 2004; Igarashi et al., 2013; Lamming and Hampson, 1996; Lippmann, 1999; Min and Galle, 2001; Schleper and Busse, 2013; Simpson and Power, 2005; Tate et al., 2012; Walton et al., 1998; Wittstruck and Teuteberg, 2012; Zhu et al., 2007)
Providing a clear meaning of sustainability (OF2)	X	X	Both	Both	6	(Koplin et al., 2007; Morali and Searcy, 2013; Nawrocka et al., 2009; Rock et al., 2006; Walton et al., 1998; Zhu et al., 2007)
Support of top and middle managers (OF3)	X	X	Both	Both	8	(Blome et al., 2014a; Gold et al., 2010a; Handfield et al., 2005; Morali and Searcy, 2013; Nawrocka et al., 2009; Walton et al., 1998; Zhu et al., 2008, 2007).
Cross-functional integration (OF4)	X	X	*Env*	Both	7	(Blome et al., 2014a; Darnall et al., 2008; Lippmann, 1999; Pereira et al., 2014; Preuss, 2001; Tong et al., 2012; Zhu et al., 2007)
Products and/or components characteristics/risk (OF5)	X	X	*Env*	Both	5	(Cramer, 2008; Lippmann, 1999; Preuss, 2001; Tong et al., 2012)
Engagement of external stakeholders (OF6)	-	X	*Soc*	*Soc*	2	(Boyd et al., 2007; Schleper and Busse, 2013)
Use of industry code/guideline/principles/initiatives (OF7)	X	X	*Soc*	Both	3	(Ashby et al., 2012; Klassen and Vereecke, 2012; Polgreen, 2002)
Internal implementation of sustainability practices (OF8)	X	X	Both	Both	6	(Boyd et al., 2007; Gold et al., 2010b; Igarashi et al., 2013; Klassen and Vereecke, 2012; Koplin et al., 2007; Schleper and Busse, 2013)
Basis for measuring supplier compliance (OF9)	X	X	Both	Both	4	(Forman and Jorgensen, 2004; Koplin et al., 2007; Schleper and Busse, 2013; Seuring and Müller, 2008)
Env – Environmental / Soc – Social / Empirical – empirical papers (case study, survey, etc.). / Concep.– Conceptual papers (literature review, SLR).						

3.2.2 Implementation of sustainability requirements

Turning to the implementation of the sustainability requirements, a greater number of factors were uncovered. The employment of the sustainability practices by suppliers might be more effective if buying firms systematically communicate their sustainability requirements (Boyd et al., 2007), the absence of which will result in barriers (Cramer, 2008). This was observed in both SME's and large multinational companies (Ciliberti et al., 2008; Leppelt et al., 2013). Thus, clear communication of the sustainability requirements (OF10) enables the diffusion of both environmental and social sustainability practices.

The evaluation of suppliers against the requirements significantly affected the implementation of sustainability practices (Ayuso et al., 2013). Boyd et al (2007) suggested that the evaluation should map the material flow through the supply chain and evaluate suppliers in terms of quality, commitment to workers' rights and local regulation. Therefore, supplier evaluation (OF11) is embraced in the proposed framework.

Personal support is necessary to implement socially and environmentally responsible procurement (Hoejmose and Adrien-Kirby, 2012), of which, finance and technology are frequently cited (e.g. Paulraj, 2011). Personal, financial and technological resources, which are internal capabilities (OF12), are influential in the implementation of the sustainability practices by suppliers.

Buying firms usually request that first tier suppliers communicate their codes of conduct and/or selected requirements (e.g. list of hazardous substance) to the low-tier suppliers (e.g. 2nd tier, 3rd tier, n tier) in order to avoid neglecting human or animal rights (Elg and Hultman, 2011). However, just communicating the requirements to the low-tier suppliers does not guarantee the implementation of sustainability practices. Any environmental or social issue with supplier across the supply chain can potentially damage the buying firm's reputation (Grimm et al., 2014). The contact by the 1st tier with low-tier suppliers was classified by Tachizawa and Wong (2014) as indirect approach of multi-tier supplier management. The authors also considered direct approach (when the focal firm establishes a direct contact with low tier suppliers, e.g. providing the selected requirements) and "work with third parties" (NGO's, competitors or third part audit companies). Nevertheless, Grimm et al. (2014) considered the need to involve the first tier suppliers directly when buying firms attempt to engage low-tier ones. Therefore, the scope for the implementation of the sustainability requirements within the supply chain was also found as being critical for diffusion of sustainability practices (OF13).

Grimm et al. (2014) also go on to highlight the volume of business with suppliers as a critical factor for engagement. The author found that the compliance with buying firms' sustainability requirements and information exchange on sustainability demanded a lot of effort and investment by suppliers. Consequently, the response from the supplier is much better when they had an acceptable order volume. Even just supported by these authors, volume of business with supplier (OF14) is included in this framework.

Contracts have been used as a mechanism to mitigate risk and provide greater transparency of information when formalising the relationships (Klassen and Vereecke, 2012). According to Morali and Searcy (2012) a contract is one of the main sources of encouraging suppliers to be more responsible, hence

they provide a clear message of the buying firm's priorities and might drive changes. Indeed, contracts are formal governance instruments usually employed in circumstances of uncertainty to specify structures, roles and conditions (Pilbeam et al., 2012). In addition, Jira and Toffel (2013) advised the definition of the information that needs to be shared as part of supplier performance assessment programme (e.g. climate change information) to increase the information sharing. Use of contracts (OF15) therefore provides transparency and defines priorities, roles, structure, conditions and information to be shared.

Support of top and middle managers (OF3), cross-functional integration (OF4) and engagement of external stakeholders (OF6) were also important for implementation of the sustainability requirements. For example, Carbone et al. (2012) outlined that the support of top managers was one of the main facilitators for the implementation of the selected requirements. The cross-functional integration might in turn avoid many environmental and social issues not only in downstream activities but also upstream, and is also useful for sustainable improvements (Seuring and Müller, 2008). This can also facilitate strategic decisions during the supplier selection, such as the size of the supplier base and the location of suppliers (local or global suppliers). The most common engagement of stakeholders were related to the supplier evaluation through third party firms (e.g. Jabbour and Jabbour, 2009; Leppelt et al., 2013).

Overall, the supplier evaluation can provide a deep understanding about how suppliers address sustainability issues (e.g. their commitment, capabilities and performance), supplier materials and information flows and compliance. Based on that, supplier evaluation can drive sustainability awareness and implementation of sustainability practices by suppliers, as well as joint learning and improvements. However, a systematic dialogue with suppliers based on clear communication and accurate information is necessary. Table 3.2 (p. 36) sums up the organisational factors identified in the literature, which might affect the diffusion of sustainability in the implementation of the sustainability requirements.

Table 3.2: Influential organisational factors for diffusing environmental and social practices through the implementation of sustainability requirements.

Organisational factors	Practices		Empirical rigour		Citation	References
	Env	Soc	Empirical	Concep.		
Clear communication of sustainability requirements (OF10)	X	X	Both	Both	26	(Ayuso et al., 2013; Bowen, 2001; Caniëls et al., 2013; Ciliberti et al., 2009, 2008; Cramer, 2008; Crotty, 2006; Forman and Jorgensen, 2004; Grimm et al., 2014; Holt, 2004; Igarashi et al., 2013; Klassen and Vereecke, 2012; Lamming and Hampson, 1996; Lo, 2014; Marimon et al., 2011; Morali and Searcy, 2013; Rock et al., 2006; Sarkis, 2012; Schleper and Busse, 2013; Sharfman et al., 2009; Srivastava, 2007; Tachizawa et al., 2012; Tachizawa and Wong, 2014; Tong et al., 2012; Zhu et al., 2012, 2010)
Supplier evaluation (OF11)	X	X	Both	Both	39	(Ayuso et al., 2013; Beske and Seuring, 2014; Bowen, 2001; Boyd et al., 2007; Caniëls et al., 2013; Chen, 2005; Ciliberti et al., 2008; Côté et al., 2008; Crotty, 2006; Elg and Hultman, 2011; Forman and Jorgensen, 2004; Gold et al., 2010a, 2010b; Govindan et al., 2015; Hollos et al., 2012; Holt, 2004; Klassen and Vereecke, 2012; Kogg and Mont, 2012; Koplin et al., 2007; Lamming and Hampson, 1996; Leppelt et al., 2013; Lippmann, 1999; Lo, 2014; Morali and Searcy, 2013; Nawrocka et al., 2009; Pagell and Wu, 2009; Paulraj, 2011; Pereira et al., 2014; Pilbeam et al., 2012; Polgreen, 2002; Rosen et al., 2001; Schleper and Busse, 2013; Srai et al., 2013; Tachizawa and Thomsen, 2012; Thornton et al., 2013; Tong et al., 2012; Walton et al., 1998; Zhu et al., 2008; Zsidisin and Siferd, 2001)
Internal capabilities (OF12)	X	X	Both	Both	5	(Ahi and Searcy, 2013; Gold et al., 2010b; Hoejmose and Adrien-Kirby, 2012; Paulraj, 2011; Wittstruck and Teuteberg, 2012)
Scope for implementation of sustainability requirements (OF13)	X	X	Both	Both	4	(Elg and Hultman, 2011; Grimm et al., 2014; Holt, 2004; Tachizawa and Wong, 2014)
Volume of business with suppliers (OF14)	X	X	Both	-	1	(Grimm et al., 2014)
Use of contract (OF15)	X	X	Both	Both	9	(Ayuso et al., 2013; Elg and Hultman, 2011; Jira and Toffel, 2013; Klassen and Vereecke, 2012; Leppelt et al., 2013; Morali and Searcy, 2013; Pilbeam et al., 2012; Rosen et al., 2001; Sarkis, 2012)
Support of top and middle managers (OF3)	X	X	Both	*Env*	7	(Carbone et al., 2012; Govindan et al., 2013; Schleper and Busse, 2013; Strand, 2013; Zhu et al., 2012a, 2010, 2008)
Cross-functional integration (OF4)	X	X	*Env*	Both	4	(Govindan et al., 2013; Seuring and Müller, 2008; Zhu et al., 2012a, 2010, 2008)
Engagement of external stakeholders (OF6)	X	X	Both	Both	10	(Ciliberti et al., 2008; Elg and Hultman, 2011; Gimenez and Tachizawa, 2012; Hoejmose and Adrien-Kirby, 2012; Jabbour and Jabbour, 2009; Klassen and Vereecke, 2012; Leppelt et al., 2013; Lippmann, 1999; Nawrocka et al., 2009; Tong et al., 2012)

Env – Environmental / Soc – Social / Empirical – empirical papers (case study, survey, etc.). / Concep.– Conceptual papers (literature review, SLR).

3.3 SUSTAINABILITY DIFFUSION THROUGH SUPPLIER PERFORMANCE ASSESSMENT

When diffusing sustainability across the supplier base an appropriate performance measurement system must be adopted. Supplier sustainability performance assessment allows buying firms to understand better the environmental impact of their suppliers (Simpson and Power, 2005), to identify what actions are needed (Gimenez and Tachizawa, 2012) and to control the implementation of the sustainability programmes through the supply chain (Green Jr et al., 2011). As before, this section first examines design then turns to implementation.

3.3.1 Design of supplier sustainability performance assessment

Managing performance assessment for a large supplier base is challenging. For effective supplier performance assessment buying firms need to be aware of which purpose will be addressed (e.g. monitoring compliance and risk, enhancing supplier's performance, life cycle perspective, e.g. carbon footprint) and who will be assessed (Gallear et al., 2012; Handfield et al., 2005; Seuring and Müller, 2008). Definition of performance assessment purpose (OF16) and definition of supplier to be assessed (OF17) is therefore important.

Furthermore, performance measures need to be consistent, comparable, reliable, valid, and applicable across sectors and countries (Shaw et al., 2010). Definition of consistent measures (OF18) needs to be aligned with the purpose. Moreover, the sustainability requirements (OF19) and buying firms' sustainability policy and strategy (OF1) were found to be influential in the design of performance measures. In turn, the selected requirements are more effective if systematically monitored and assessed by buyers (Hoejmose and Adrien-Kirby, 2012). The buying firm's sustainability policy and strategies express the firm's own sustainability goals and clearly articulate its expectations with supplier's performance (Lippmann, 1999).

In addition, the expertise gained by the implementation of management systems (e.g. SA8000, OHSAS 18001, ISO 14001) and measurement system (ISO 14031, existing balanced scored card, GRI) can facilitate the design of consistent assessment measures to be used, in turn, for process management (Beske-Janssen et al., 2015). Such measurement (OF20) and management systems (OF21) are examples of practices implemented by buying firms to improve their knowledge of sustainability issues, potential solutions as well as barriers (Schaltegger and Burritt, 2014).

As observed in the design of requirements, support of top and middle managers (OF3), cross-functional integration (OF4), engagement of external stakeholders (OF6) and use of industry code/guideline/principles/initiatives (OF7) were also influential in the design of performance assessment. Hervani et al. (2005) stated that top managers played a vital role by helping to address the definition of purpose, measures and resources. Moreover, the authors claimed that the involvement of internal functional areas (e.g. operations, accounting,

health, safety and environment) avoided a lack of understanding of the multi-organisational measures. Shaw et al. (2010) highlighted the engagement of external stakeholders (e.g. customers, suppliers, NGO's, government) as an influential factor to design the SSPA measures (OF6). Okongwu et al (2013) recommended the use of standards like FLA (Fair Labours Association on ethical and social sustainability).

Table 3.3 (p. 39) presents factors associated with the design of supplier sustainability performance assessment, which might affect the diffusion of sustainability. Performance assessment needs to be fairly consistent in order to assist suppliers in their compliance progress, compare suppliers overall sustainability performance between different supply chains (Ahi and Searcy, 2015) and provide them directions to select and implement the best sustainability practices (Mcintyre et al., 1998).

Table 3.3: Influential organisational factors for considering environmental and social practices in the design of supplier performance assessment.

Organisational factors	Practices		Empirical rigour		Citation	References
	Env	Soc	Empirical	Concep.		
Definition of performance assessment purpose (OF16)	X	X	Both	Both	2	(Dües et al., 2013; Gold et al., 2010a; Nawrocka et al., 2009)
Definition of suppliers to be assessed (OF17)	X	X	Both	Both	4	(Dües et al., 2013; Gallear et al., 2012; Handfield et al., 2005; Seuring and Müller, 2008)
Definition of consistent performance measures (OF18)	X	X	Both	Both	11	(Beamon, 1999; Beske-Janssen et al., 2015; Gallear et al., 2012; Gimenez and Tachizawa, 2012; Handfield et al., 2005; Hervani et al., 2005; Hutchins and Sutherland, 2008; Klassen and Vereecke, 2012; Shaw et al., 2010; Simpson and Power, 2005; Srivastava, 2007)
Sustainability requirements (OF19)	X	X	Both	Both	5	(Ashby et al., 2012; Hoejmose and Adrien-Kirby, 2012; Koplin et al., 2007; Leppelt et al., 2013; Testa and Iraldo, 2010)
Measurement systems implemented (OF20)	X	X	Both	Both	7	(Beske-Janssen et al., 2015; Dou et al., 2014b; Hervani et al., 2005; Morali and Searcy, 2013; Schaltegger and Burritt, 2014; Shaw et al., 2010; Varsei et al., 2014)
Management systems implemented (OF21)	X	X	Both	Both	13	(Ahi and Searcy, 2015; Beske-Janssen et al., 2015; Gold et al., 2010a; Green Jr et al., 2012; Hervani et al., 2005; Klassen and Vachon, 2003; Klassen and Vereecke, 2012; Marshall et al., 2015; Nawrocka et al., 2009; Okongwu et al., 2013; Seuring and Müller, 2008; Shaw et al., 2010; Wong et al., 2015)
Buying firm's sustainability policy and strategy (OF1)	X	X	-	Both	5	(Ashby et al., 2012; Beske and Seuring, 2014; Hervani et al., 2005; Lippmann, 1999; Shaw et al., 2010)
Support of top and middle managers (OF3)	X	-	-	*Env*	1	(Hervani et al., 2005)
Cross-functional integration (OF4)	X	-	-	*Env*	2	(Hervani et al., 2005; Shaw et al., 2010)
Engagement of external stakeholders (OF6)	X	X	*Soc*	Both	9	(Ayuso et al., 2013; Beske-Janssen et al., 2015; Hervani et al., 2005; Kogg and Mont, 2012; Okongwu et al., 2013; Rosen et al., 2001; Shaw et al., 2010; Tachizawa and Wong, 2014; Tong et al., 2012)
Use of industry code/guideline/principles/initiatives (OF7)	X	X	*Soc*	Both	6	(Ashby et al., 2012; Beske and Seuring, 2014; Boyd et al., 2007; Ciliberti et al., 2008; Okongwu et al., 2013; Varsei et al., 2014)
Env – Environmental / Soc – Social / Empirical – empirical papers (case study, survey, etc.). / Concep.– Conceptual papers (literature review, SLR).						

3.3.2 Implementation of supplier sustainability performance assessment

The implementation of supplier sustainability performance assessment requires buying firms to implement mechanisms and structure (Nawrocka et al., 2009). There is a broad array of performance mechanisms, raging from direct buying firm initiatives to the use of third party mechanisms. Furthermore, it was found that the availability of financial resources was influential on the choose the supplier sustainability performance assessment mechanism (Shaw et al., 2010). Consequently, the definition of mechanisms to gather and assess supplier performance is important (OF22).

As with the development of internal capabilities earlier, training for purchasing staff needs to be emphasised (Gimenez and Tachizawa, 2012). Gallear et al. (2012) found that the effort of buying firms to increase ethical and environmental awareness among their employees has a direct effect on suppliers' perception in terms of a fair treatment given by buyers. Consequently, training purchasing staff on sustainability needs to be emphasised (OF23).

Ongoing information exchange is key for all supply chain partners (Wittstruck and Teuteberg, 2012), mainly in terms of performance improvements and fostering greater environmental supplier development (Vachon and Klassen, 2006). Jira and Toffel (2013) uncovered that unclear costs and benefits, as well as uncertainties on how buyers would interpret and use the information collected, were potential barriers to suppliers sharing information (e.g. impact in future procurement decision). A clear understanding of the benefits and risk of sharing information is necessary (Gimenez and Tachizawa, 2012). This consists of an organisational factor (OF24).

Bakker and Nijhof (2002) also found that enhanced communication is key for implementing assessment (OF25). A strengthened relationship is also presented in the literature as an influential factor for the diffusion of sustainability through performance assessment implementation (OF26). This includes traits of mutual commitment (Simpson and Power, 2005), trust (Gold et al., 2010b; Hassini et al., 2012), long-term relationship (Beske et al., 2014), and sharing responsibilities (Hervani et al., 2005).

This, in turn, can lead to a better understanding of suppliers' capabilities to engage (Hajmohammad et al., 2013). This can lead to synergy for the implementation of environmental practices (Shaw et al., 2010). In addition, Dou et al. (2014b) found that buyers needed to verify the support of suppliers' top managers for improvement in performance. Therefore, understanding suppliers' capabilities (OF27) and the support of senior managers (OF28) are considered in the proposed framework.

Supporting and assisting suppliers in the assessment (OF29) was also uncovered. This can ensure the proper process to collect and assess data and understand potential sustainability practices for improvements (Jira and Toffel, 2013; Marshall et al., 2015). Of note from Vachon and Klassen (2008) was the value of collaboration, enabling ongoing information exchange and understanding of responsibilities. Correspondingly, Lee and Cheong (2011) found that a collaborative approach with key suppliers was critical for measuring and improving performance related to the climate change challenge. Indeed, collaboration impacted the suppliers' monitoring activities and consequently their performance (Green Jr et al., 2011). Likewise, collaborative approaches

with suppliers (OF30) facilitate monitoring supplier performance and consequently diffusion of sustainability practices.

After gathering and assessing supplier data, the way that buying firms engage with their supplier for the assessment feedback is an important aspect for enhancing the sustainability diffusion (e.g. Agan et al., 2016; Dou et al., 2014a). Indeed, the feedback might impact their behaviour and improve performance. Dou et al. (2014b) found that buyers frequently implement a formal requirement of improved performance expectations. Porteous et al. (2015) suggested the establishment of procedure to analyse suppliers' non-compliances (e.g. regulations and selected requirements), including the analysis of trade-off (e.g. severity of the non-compliance and zero tolerance reaction – termination of the contract or reduce the volume of business), non-compliance treatment and reduction of the amount of non-compliance. The establishment of goals/targets was also presented by Schaltegger and Burritt (2014). Finally, Shaw et al. (2010) argued that buying firms need to establish supplier benchmarking to continuously improve. The authors found that this enables the implementation of best practice and better cross-firm involvement.

In summary, table 3.4 (p. 42) provides the influential organisational factors for implementing supplier sustainability performance assessment identified in the literature and enhancing the diffusion of sustainability. It should be noted that the factors OF3, OF4, OF6 and OF11 were also evident in the performance assessment. In general, the internal commitment (e.g. support from managers, training, capabilities), supplier commitment (capabilities, information sharing) as well as mutual (responsibilities, benefits) are included in the proposed framework. Interestingly, the factors OF27 and OF28 were supported by papers that considered only the diffusion of environmental practices.

Table 3.4: Influential organisational factors for diffusing environmental and social practices through the implementation of performance assessment.

Organisational factors	Practices		Empirical rigour		Citation	References
	Env	Soc	Empirical	Concep.		
Performance mechanisms (OF22)	X	X	Both	Both	15	(Agan et al., 2016; Dou et al., 2014; Forman and Jorgensen, 2004; Handfield et al., 2005; Hervani et al., 2005; Hutchins and Sutherland, 2008; Jira and Toffel, 2013; Klassen and Vachon, 2003; Klassen and Vereecke, 2012; Morali and Searcy, 2013; Nawrocka et al., 2009; Rock et al., 2006; Shaw et al., 2010; Testa and Iraldo, 2010; Touboulic and Walker, 2015)
Training purchasing staff on sustainability (OF23)	X	X	Both	Both	8	(Chen, 2005; Gallear et al., 2012; Gimenez and Tachizawa, 2012; Gold et al., 2010b; Hervani et al., 2005; Nawrocka et al., 2009; Schaltegger and Burritt, 2014; Seuring and Müller, 2008)
Understanding of benefits and risk of sharing information (OF24)	X	X	*Env*	Both	2	(Gimenez and Tachizawa, 2012; Jira and Toffel, 2013)
Enhanced communication with suppliers (OF25)	X	X	Both	Both	21	(Ashby et al., 2012; Bakker and Nijhof, 2002; Beske-Janssen et al., 2015; Beske and Seuring, 2014; Gimenez and Tachizawa, 2012; Gold et al., 2010a; Hajmohammad et al., 2013; Handfield et al., 2005; Hassini et al., 2012; Jira and Toffel, 2013; Klassen and Vereecke, 2012; Meacham et al., 2013; Pagell and Wu, 2009; Paulraj, 2011; Pilbeam et al., 2012; Seuring and Müller, 2008; Simpson and Power, 2005; Tachizawa and Wong, 2014; Varsei et al., 2014; Wittstruck and Teuteberg, 2012; Wong et al., 2015)
Strengthened relationship (OF26)	X	X	Both	Both	6	(Agan et al., 2016; Beske and Seuring, 2014; Gold et al., 2010b; Hassini et al., 2012; Hervani et al., 2005; Simpson and Power, 2005)
Understanding suppliers' capability (OF27)	X	-	*Env*	*Env*	4	(Hajmohammad et al., 2013; Handfield et al., 2005; Shaw et al., 2010; Touboulic and Walker, 2015b)
Support of suppliers' top managers (OF28)	X	-	*Env*	-	1	(Dou et al., 2014b)
Supporting and assisting suppliers in the assessment (OF29)	X	X	Both	-	3	(Jira and Toffel, 2013; Marshall et al., 2015; Nakano and Hirao, 2011)
Collaborative approaches with suppliers (OF30)	X	X	Both	Both	18	(Agan et al., 2016; Ahi and Searcy, 2015; Ashby et al., 2012; Beske-Janssen et al., 2015; Dou et al., 2014a, 2014b, Gold et al., 2010a, 2010b; Green Jr et al., 2011; Klassen and Vachon, 2003; Marshall et al., 2015; Schaltegger and Burritt, 2014; Seuring and Müller, 2008; Simpson and Power, 2005; Touboulic and Walker, 2015b; Vachon and Klassen, 2008; Wang and Sarkis, 2013; Wong et al., 2015)
Env – Environmental / Soc – Social / Empirical – empirical papers (case study, survey, etc.). / Concep.– Conceptual papers (literature review, SLR).						

Table 3.4: (Cont.)

Organisational factors	Practices		Empirical rigour		Citation	References
	Env	Soc	Empirical	Concep.		
Feeding back supplier performance assessment (OF31)	X	X	Both	Both	20	(Agan et al., 2016; Ashby et al., 2012; Beske-Janssen et al., 2015; Blome et al., 2014b; Dou et al., 2014a, 2014b; Gold et al., 2010b; Green Jr et al., 2012; Handfield et al., 2005; Hervani et al., 2005; Klassen and Vachon, 2003; Lo, 2014; Marshall et al., 2015; Morali and Searcy, 2013; Porteous et al., 2015; Rosen et al., 2001; Schaltegger and Burritt, 2014; Seuring and Müller, 2008; Shaw et al., 2010; Touboulic and Walker, 2015b)
Cross-functional integration (OF3)	X	X	*Env*	Both	3	(Gold et al., 2010b; Hervani et al., 2005; Nawrocka et al., 2009)
Support of top and middle managers (OF4)	X	X	Env	Both	3	(Handfield et al., 2005; Hervani et al., 2005; Nawrocka et al., 2009)
Engagement of external stakeholders (OF6)	X	X	Both	Both	17	(Bakker and Nijhof, 2002; Beske and Seuring, 2014; Ciliberti et al., 2008; Elg and Hultman, 2011; Green Jr et al., 2012; Grimm et al., 2014; Kogg and Mont, 2012; Marshall et al., 2015; Morali and Searcy, 2013; Nawrocka et al., 2009; Okongwu et al., 2013; Porteous et al., 2015; Rosen et al., 2001; Schaltegger and Burritt, 2014; Tachizawa and Wong, 2014; Tong et al., 2012; Varsei et al., 2014)
Internal capabilities (OF11)	X	X	Both	Both	8	(Gimenez and Tachizawa, 2012; Hassini et al., 2012; Hervani et al., 2005; Hutchins and Sutherland, 2008; Kogg and Mont, 2012; Porteous et al., 2015; Rock et al., 2006; Shaw et al., 2010)
Env – Environmental / Soc – Social / Empirical – empirical papers (case study, survey, etc.). / Concep.– Conceptual papers (literature review, SLR).						

3.4 SUSTAINABILITY DIFFUSION THROUGH SUPPLIER DEVELOPMENT

The diffusion of environmental and social sustainability practices is strongly related to the level of supplier development. As before, this section is divided into the design and implementation of supplier sustainability development.

3.4.1 Design of supplier sustainability development

Supplier sustainability development is a multi-faceted concept, hence it has a strong interaction with supplier performance assessment and supplier selection (Agan et al., 2016). Nagel (2003) argued that the implementation of supplier sustainability development could not take place without supplier performance assessment. Actually, performance is a step torward supplier development (Krause, 1997), hence it serves as a baseline for subsequent planning actions and improvements (Bai and Sarkis, 2010; Noshad and Awasthi, 2015). It is important to note that the improvement in the supplier sustainability performance is one of the main purposes of the supplier development (Krause, 1997).

Supplier sustainability development is also linked to the supplier selection in terms of support and knowledge transfer to help suppliers to comply with the selected sustainability requirements (e.g. Agan et al., 2016; Fu et al., 2012; Trapp and Sarkis, 2016). Noshad and Awasthi (2015) argued that finding suppliers already organised to meet the selected requirements is likely to be a challenge to buying firms. The authors suggested that this could be overtaken by developing suppliers' capabilities. Supplier development also addresses the firms sustainability agenda (Dou et al., 2014b), including policy, strategies and values (e.g. Beske and Seuring, 2014; Lee and Cheong, 2011).

Considering the limited resources to employ in supplier sustainability development initiatives, buying firms need to priorise the investments by precisely designing the supplier development purpose and defining the development initiatives (Bai and Sarkis, 2010). Uniquely, the definition of supplier development purpose (OF32) is a starting point for supplier development. The design of the development purpose could therefore take into consideration the buyer' sustainability policy and strategies (OF1), sustainability requirements (OF19) and the outcomes from the supplier sustainability performance assessment (OF35).

Trapp and Sarkis (2016) suggested identifying the suppliers to be engaged in development initiatives. The authors stated that not all suppliers would require the same level of supplier sustainability development mechanisms, such as training, investment. Agan et al (2016) suggested that buying firms needed to involve close, long-lasting and strategic suppliers. Indeed, the relationship with key suppliers can enable the mutual effort, integration, information exchange and resources (Noshad and Awasthi, 2015). In contrast, Akman (2015) proposed a model to select suppliers for green development based on their performance including delivery, quality, cost, service and green measures (all suppliers were evaluated). The last one covered the use of design for

environment (DFE) approaches, reducing the use of resources and pollution, reputation, and capability and management – ISO 14001, ability to change process). Sancha et al. (2015) found that previous experience with critical supplier though collaborative (e.g. making joint decisions - product design or quality improvements was helpful to select suppliers for development) (OF30). Consequently, the definition of suppliers to be engaged through supplier development is a critical factor for diffusion of sustainability practices (OF34).

It is important to emphasise that the development purpose and initiatives, as well as the suppliers to be engaged, are critical factors for sustainability diffusion. For that, Pagell and Wu (2009) emphasised the importance of the integration and support from top management as well as their comprehension of sustainability as an organisational commitment (OF3). They can influence according their expectation the development with projects with suppliers (Ehrgott et al., 2013). Cross-functional integration, for instance between environmental management, research and development, production and procurement (Ehrgott et al., 2013; Govindan et al., 2010), is also an important component for the designing of supplier sustainability development (e.g. Agan et al., 2016; Lee and Cheong, 2011; Trapp and Sarkis, 2016). This can also produce a better knowledge about the product and components (Beske and Seuring, 2014).

Zhu et al. (2012) found that the existence of a high level of internal environmental management was a common behaviour of manufacturers to diffuse environmental practices across the supplier base. Indeed, a pattern was evidenced in the papers reviewed in chapter 3, in terms of implementation of sustainability practices by buying firms, which were influential for supplier sustainability development. For instance, environmental management system (ISO 14001) is one of the most frequent sustainability practices implemented by buyers, followed by design for environmental (Ashby et al., 2012; Diabat et al., 2014), recycling (e.g. Blome et al., 2014; Hajmohammad et al., 2013), code of conduct and corporate social responsibility initiatives (Beske and Seuring, 2014; Sancha et al., 2015) and LCA (Holt and Ghobadian, 2009; Pagell and Wu, 2009). Less frequent, cleaner production (Hajmohammad et al., 2013; Handfield et al., 2005), green procurement (environmental consideration in the supplier selections) and compliance with regulation (Diabat et al., 2014; Fu et al., 2012) are also identified. Therefore, the internal implementation of sustainability practices (OF8) is also considered in the proposed framework as an influential diffusion factor.

To sum up, influential factors related to the design of supplier sustainability development are presented in Table 3.5 (p. 46). Regarding these factors, buying firms can enhance the diffusion of environmental and social sustainability practices by properly planning the supplier development initiatives, especially taking into consideration the purpose, suppliers and resources needed.

Table 3.5: Influential organisational factors for considering environmental and social practices in the design of supplier development.

Organisational factors	Practices		Empirical rigour		Citation	References
	Env	Soc	Empirical	Concep.		
Definition of supplier development purpose (OF32)	X	X	*Env*	Both	2	(Bai and Sarkis, 2010; Dou et al., 2014a)
Definition of development Initiative (OF33)	X	-	*Env*	-	1	(Dou et al., 2014a)
Definition of suppliers to be engaged (OF34)	X	X	Both	-	7	(Agan et al., 2016; Akman, 2015; Bai and Sarkis, 2010; Blome et al., 2014a; Noshad and Awasthi, 2015; Sancha et al., 2015; Trapp and Sarkis, 2016)
Supplier sustainability performance assessment (OF35)	X	X	Both	Both	15	(Agan et al., 2016; Bai and Sarkis, 2010; Blome et al., 2014a, 2014b; Caniëls et al., 2013; Dou et al., 2014a, 2014b; Fu et al., 2012; Gold et al., 2010b; Nagel, 2003; Noshad and Awasthi, 2015; Pagell and Wu, 2009; Sancha et al., 2015; Tate et al., 2012; Trapp and Sarkis, 2016)
Buying firm's sustainability policy and strategy (OF1)	X	X	Both	Both	6	(Beske and Seuring, 2014; Dou et al., 2014a; Fu et al., 2012; Lee and Cheong, 2011; Noshad and Awasthi, 2015; Trapp and Sarkis, 2016)
Support of top and middle managers (OF3)	X	X	Both	Both	8	(Bai and Sarkis, 2010; Beske and Seuring, 2014; Ehrgott et al., 2013; Fu et al., 2012; Gimenez and Tachizawa, 2012; Lee and Cheong, 2011; Pagell and Wu, 2009; Tachizawa and Thomsen, 2012)
Cross-functional integration (OF4)	X	X	Both	Both	7	(Bai and Sarkis, 2010; Beske and Seuring, 2014; Ehrgott et al., 2013; Govindan et al., 2013; Lee and Cheong, 2011; Lippmann, 1999; Trapp and Sarkis, 2016)
Products and/or components characteristics/risk (OF5)	X	X	*Env*	Both	2	(Bai and Sarkis, 2010; Beske and Seuring, 2014)
Internal implementation of sustainability practices (OF8)	X	X	Both	Both	15	(Ashby et al., 2012; Beske and Seuring, 2014; Blome et al., 2014b; Caniëls et al., 2013; Diabat et al., 2014; Fu et al., 2012; Hajmohammad et al., 2013; Holt and Ghobadian, 2009; Lee and Cheong, 2011; Nawrocka et al., 2009; Pagell and Wu, 2009; Sancha et al., 2015; Trapp and Sarkis, 2016; Vachon and Klassen, 2008; Zhu et al., 2012a)
Sustainability requirements (OF19)	X	X	*Env*	Both	8	(Agan et al., 2016; Beske and Seuring, 2014; Caniëls et al., 2013; Dou et al., 2014a; Fu et al., 2012; Lee and Cheong, 2011; Noshad and Awasthi, 2015; Trapp and Sarkis, 2016)
Collaborative approaches with suppliers (OF30)	X	X	Both	Both	10	(Agan et al., 2016; Bai and Sarkis, 2010; Beske and Seuring, 2014; Dou et al., 2014a; Gimenez and Tachizawa, 2012; Noshad and Awasthi, 2015; Pagell and Wu, 2009; Sancha et al., 2015; Simpson and Power, 2005; Zhu et al., 2007)
Env – Environmental / Soc – Social / Empirical – empirical papers (case study, survey, etc.). / Concep.– Conceptual papers (literature review, SLR).						

3.4.2 Implementation of supplier sustainability development

The implementation of supplier sustainability development involves an intensive commitment of resource (Ahmed and Hendry, 2012; Wong et al., 2015; Zhu et al., 2012a). Each resource can take the form of information (Wagner and Krause, 2009), personnel (Krause et al., 1998), structures and processes (Wagner, 2006) and financial resources (Gimenez and Tachizawa, 2012; Sancha et al., 2015). Agan et al. (2016) found that additional employees involved and cross-functional integration were essential for the supplier environmental development implementation. Implicit support of top and middle management is also expected for more mature adoption of supplier development programmes (Dou et al., 2014b). Furthermore, Lippmann (1999) mentioned the need of training for staff involved.

The commitment of resources is also expected from suppliers. Both buying firms and suppliers can better understand where and how to invest resources (Dou et al., 2014b). This is one way to represent a joint engagement between the buying firm and suppliers (Krause and Ellram, 1997) and it is therefore an influential factor that affects the diffusion of sustainability practices. Ehrgott et al. (2013) found that understanding the supplier's capability (e.g. technological and managerial skills) allowed the buyer evaluate the supplier's capacity to innovate and remain competitive. Moreover, the commitment of suppliers' top management for sustainability initiatives is identified as a diffusion sustainability factor (Dou et al., 2014a; Fu et al., 2012; Klassen and Vachon, 2003).

Therefore, most of the factors identified in the implementation of supplier selection and performance were also evident in the suppliers development, namely: support of top and middle managers (OF3), cross-functional integration (OF4), internal capabilities (OF11), training purchasing staff on sustainability (OF23), enhanced communication with suppliers (OF25), strengthened relationship (OF26), understanding suppliers' capability (OF27) and support of suppliers' top managers (OF28).

Collaborative approaches with suppliers (OF30) were also frequently reported as an influential factor for sustainability diffusion through development initiatives. These provide a mutual learning by understanding of each other's responsibility and capability regarding environmental management (Vachon and Klassen, 2008), knowledge exchange to facilitate sustainable products and process (Vachon and Klassen, 2006) and trust (Caniëls et al., 2013). It is important to emphasise that there is an evident overlap between collaboration (Gimenez and Tachizawa, 2012; Hollos et al., 2012; Morali and Searcy, 2013; Rota, C., Reynolds, N., Zanasi, 2013; Tachizawa et al., 2012) and supplier development. Basically, they have similar characteristic in their definitions and initiatives (examples of engagement). For instance, long-term relationship, shared responsibility, cooperative effort, information sharing were commonly observed. Joint initiatives, for example collaborative approaches for developing solving problem and educating initiatives were also commonly observed (e.g. Bai and Sarkis, 2010; Ehrgott et al., 2013; Seuring and Müller, 2008; Touboulic and Walker, 2015; Vachon and Klassen, 2008). Therefore, it is common to find in papers on sustainability collaboration the inclusion of research constructs regarding supplier development (e.g. training on sustainability issues, technical assistance to implement sustainability practices) and papers on supplier

development using collaborative approaches (e.g. joint plan) as constructs (e.g. Bai and Sarkis, 2010; Ciliberti et al., 2008; Ehrgott et al., 2013; Gallear et al., 2012).

Finally, Leppelt et al. (2013) described the need to assess the impact of the supplier sustainability development implementation. The authors found that auditing suppliers, especially the progress of an action plan to treat non-compliances, was typically adopted by buying firms to meet this need. In this sense, the effectiveness of the initiative can be evaluated, especially in terms of the accomplishment of the development purpose. Therefore, this suggests that the assessment of the impact of the supply chain initiative (OF36) is influential for diffusion of sustainability practices.

Table 3.6 (p. 49) presents the organisational factors for diffusing environmental and social sustainability practices through the implementation of supplier development. Interestingly, collaborative approaches with suppliers was one of the most mentioned factors compared with the other elements of the framework. The factors OF3, OF4 and OF23 were supported by papers that focused only on environmental practices.

Table 3.6: Influential organisational factors for diffusing environmental and social practices through the implementation of supplier development.

Organisational factors	Practices		Empirical rigour		Citation	References
	Env	Soc	Empirical	Concep.		
Assessment of the impact of the supplier development initiative (OF36)	X	X	Both	-	3	(Handfield et al., 2005; Leppelt et al., 2013; Morali and Searcy, 2013)
Support of top and middle managers (OF3)	X	-	*Env*	-	2	(Dou et al., 2014b; Touboulic and Walker, 2015b)
Cross-functional integration (OF4)	X	-	*Env*	-	1	(Agan et al., 2016)
Internal capabilities (OF11)	X	X	Both	Both	9	(Bai and Sarkis, 2010; Blome et al., 2014b; Gimenez and Tachizawa, 2012; Noshad and Awasthi, 2015; Pagell and Wu, 2009; Sancha et al., 2015; Simpson and Power, 2005; Touboulic and Walker, 2015b; Zhu et al., 2012a)
Training purchasing staff on sustainability (OF23)	X	-	-	*Env*	1	(Lippmann, 1999)
Enhanced communication with suppliers (OF25)	X	X	Both	Both	10	(Beske and Seuring, 2014; Fu et al., 2012; Lippmann, 1999; Noshad and Awasthi, 2015; Pagell and Wu, 2009; Sancha et al., 2015; Sarkis, 2012; Simpson and Power, 2005; Tate et al., 2012; Vachon and Klassen, 2006)
Strengthened relationship (OF26)	X	X	Both	Both	15	(Agan et al., 2016; Bai and Sarkis, 2010; Beske and Seuring, 2014; Brockhaus et al., 2013; Dou et al., 2014a; Fu et al., 2012; Gimenez and Tachizawa, 2012; Noshad and Awasthi, 2015; Pagell and Wu, 2009; Rizzi et al., 2013; Sancha et al., 2015; Sharfman et al., 2009; Simpson and Power, 2005; Tate et al., 2012; Touboulic and Walker, 2015b)
Understanding suppliers' capability (OF27)	X	X	*Env*	Both	3	(Caniëls et al., 2013; Ehrgott et al., 2013; Gimenez and Tachizawa, 2012)
Support of suppliers' top managers (OF28)	X	-	*Env*	-	3	(Dou et al., 2014b; Fu et al., 2012; Klassen and Vachon, 2003)
Collaborative approaches with suppliers (OF30)	X	X	Both	Both	36	(Ashby et al., 2012; Beske and Seuring, 2014; Brockhaus et al., 2013; Caniëls et al., 2013; Chan, 2007; Crotty, 2006; Dou et al., 2014b; Ehrgott et al., 2013; Forman, M.; Jorgensen, 2004; Fu et al., 2012; Gallear et al., 2012; Gimenez and Tachizawa, 2012; Gold et al., 2010b; Govindan et al., 2013; Green Jr et al., 2012; Handfield et al., 2005; Hollos et al., 2012; Holt and Ghobadian, 2009; Klassen and Vachon, 2003; Lippmann, 1999; Nawrocka et al., 2009; Noshad and Awasthi, 2015; Pagell and Wu, 2009; Rizzi et al., 2013; Roy and Whelan, 1992; Sancha et al., 2015; Sarkis, 2012; Sarkis et al., 2011; Sharfman et al., 2009; Tong et al., 2012; Touboulic and Walker, 2015b; Vachon and Klassen, 2008, 2006; Wong et al., 2015; Zhu et al., 2008, 2007)

Env – Environmental / Soc – Social / Empirical – empirical papers (case study, survey, etc.). / Concep.– Conceptual papers (literature review, SLR).

3.5 FRAMEWORK SUSTAINABILITY DIFFUSION TO SUPPLIERS

The proposed framework links supply chain management activities critical for diffusing sustainability practices by clustering organisational factors identified in the systematic literature review. The framework depicted in Table 3.7 (p. 51) captures the three clusters of design and implementation factors that align to the functional activities in supply chain management and emphasise organisational factors relevance. The factors and their alignment to one or more of the supply chain management functions are shown in the table. Factors may belong to more than one cluster and the horizontal shading in the table indicates the primary relationship.

In general, it was found that buying firms usually provide their sustainability priorities and impose on suppliers to implement sustainability practices during the supplier selection. Suppliers' evaluation and contracts are important for that. The evaluation is helpful to understand supplier compliance and capability as well as to identify partners to collaborate in sustainability initiatives or potential areas for improvements. Contracts are in turn frequently used to encourage suppliers to act in line with the selected sustainability requirements. Supplier performance assessment is also influential for the diffusion of sustainability practices. For that, supporting and assisting suppliers during the process is imperative. Furthermore, feedback activities might impact supplier behaviour, capability and performance over time. The supplier development is a direct effort of customers to help suppliers to improve performance and capabilities as well as to work together in sustainability initiatives for developing innovation and technologies, addressing carbon challenges, integration in product development. This might help both buying firms and suppliers to move forward with more commitment to sustainability and long-term relationship. However, this is totally dependent on the purpose addressed in the design of the supplier development.

Some factors affecting the diffusion of sustainability practices were observed in all supply chain activities considered. For instance the firm's sustainability policy and strategies are influential for both designs of the sustainability requirements (e.g. expected behaviour, specification on sustainability, product, regulation, standards for process and facilities), performance measures and supplier development initiatives. Cross-functional integration is effective for all elements of supply chain management activities considered. The diffusion of sustainability practices also requires internal capabilities (personal, financial and technological resources) and support of top and middle managers for the implementation of the sustainability requirements, supplier performance assessment and development.

Therefore, the proposed framework depicts patterns of the factors and points out the most critical variables influencing the diffusion of sustainability practices. This provides a foundation by which the diffusion of environmental and social sustainability practices occurs.

Table 3.7: Diffusion factors for supplier sustainability enhancement clustered by supplier selection, supplier performance assessment and supplier development.

Influential diffusion factors	Supplier selection (Sustainability requirements)		Supplier performance assessment		Supplier development	
	Design	Implement.	Design	Implement.	Design	Implement.
Buying firm's sustainability policy and strategy (OF1)	X		X		X	
Providing a clear meaning of sustainability (OF2)	X	X	X	X	X	X
Support of top and middle managers (OF3)	X	X	X	X	X	X
Cross-functional integration (OF4)	X				X	
Products and/or components characteristics/risk (OF5)	X					
Engagement of external stakeholders (OF6)	X	X	X	X		
Use of industry code/guideline/principles/initiatives (OF7)	X		X			
Internal implementation of sustainability practices (OF8)	X				X	
Basis for measuring supplier compliance (OF9)	X					
Clear communication of sustainability requirements (OF10)		X				
Supplier evaluation (OF11)		X		X		X
Internal capabilities (OF12)		X				
Scope for implementation of sustainability requirements (OF13)		X				
Volume of business with suppliers (OF14)		X				
Use of contract (OF15)		X				
Definition of performance assessment purpose (OF16)			X			
Definition of suppliers to be assessed (OF17)			X			
Definition of consistent performance measures (OF18)			X			
Sustainability requirements (OF19)			X		X	
Measurement systems implemented (OF20)			X			
Management systems implemented (OF21)			X			
Performance mechanisms (OF22)				X		
Training purchasing staff on sustainability (OF23)				X		X
Understanding of benefits and risk of sharing information (OF24)				X		
Enhanced communication with suppliers (OF25)				X		
Strengthened relationship (OF26)				X		X
Understanding suppliers' capability (OF27)				X		X
Support of suppliers' top managers (OF28)				X		X
Supporting and assisting suppliers in the assessment (OF29)				X		
Collaborative approaches with suppliers (OF30)				X	X	X
Feeding back supplier performance assessment (OF31)				X		
Definition of supplier development purpose (OF32)					X	
Definition of development Initiative (OF33)					X	
Definition of suppliers to be engaged (OF34)					X	
Supplier sustainability performance assessment (OF35)					X	
Assessment of the impact of the supplier development initiative (OF36)						X

3.6 SUMMARY OF THE CHAPTER

This chapter provides the answers of the research questions RQ1 (How are environmental and social sustainability practices diffused across the supplier base?) and RQ3 (What are the influential organisational factors in the supply chain management activities for diffusion of environmental and social sustainability practices?). It sought to establish the influential organisational factors in the supply chain management activities for diffusion of environmental and social sustainability practices. The proposed framework links supply chain management activities, namely supplier selection, performance assessment and development. Actually, the integration of these activities is required to systematically diffuse environmental and social sustainability practices across the supplier base. The framework is developed directly from the clusters of 36 driving factors associated with the three aforementioned identified in the systematic literature review.

The factors were rigorously identified and provided an orientation to diffuse both environmental and social sustainability practices according to different conditions and purposes (e.g. risk management, improvements in products, strengthening the relationship, collaborative approaches). Likewise, the proposed framework extends prior conceptual researches conducted by Beske and Seuring (2014) and Seuring and Müller (2008) by providing an analysis on the factor and how the sustainability practices diffusion occurs through the integration of supplier selection, performance assessment and development.

Furthermore, even the proposed framework focuses on the role of buying manufacturing firms, understanding the influential factors related to the suppliers for implementing environmental and social practices and therefore for sustainability diffusion is also captured. It emphasises the relevance of internal factors (intra-factors buyer's perspective, e.g. OF3, OF4, OF12 and OF23), external factors (suppliers' perspective, e.g. OF24, OF27 and OF28) and factors that are common for both buyers and suppliers (inter-factors, e.g. OF25 and OF26), extending therefore previous researches, which focus on one of these categories (Ashby et al., 2012; Gold et al., 2010b; Wong et al., 2015).

The contribution of this chapter is therefore to depict patterns of the factors and points out the most critical variables influencing the sustainability practices diffusion. This provides a foundation by which the diffusion of environmental and social sustainability practices occurs and can be enhanced.

There might be some overlap among the factors, practices and mechanisms presented in the framework. This can be justified by the theoretical nature of this chapter, which is the core limitation. This conceptual framework will be considered in the design of the empirical phase of this research, i.e. the data collection and analysis.

CHAPTER 4

Diffusion of Innovation Theory

4.1 INTRODUCTION

This chapter introduces the organisational theory chosen as a background theoretical lens in the research. Organisational theories have the power to explain a phenomenon and can drive the creation of knowledge (Boer et al., 2015). The diffusion of innovation theory (DoI) (Roger, 2003) is adopted in this research in order to add richness for the analysis of the findings.

The focus of DoI captures the transfer of practices between two separate parties. For instance, the diffusion can occur from one external stakeholder (e.g. non governmental organization – NGO) to a firm, or one firm of the supply chain to another or whole supply chain (Carbone et al., 2012). DoI is an established theory in SSCM field and there is justification to use it from the point of view of continuation of similar thinking in the area as well as the applicability.

The objectives of this chapter are:

- to introduce the concepts and elements of the DoI; and
- to analyse the application of DoI in the context of SSCM, focusing on practices diffused, diffusion mechanisms adopted, DoI elements covered, organisational factors covered and research methods.

4.2 ORGANISATIONAL THEORIES IN SUSTAINABLE SUPPLY CHAIN MANANEGEMENT

Sarkis et al. (2011, p. 2) defined organisational theories “as a management insight that can help explain or describe organisational behaviour, designs or structures”. Touboulic and Walker (2015) investigated organisational theories used in the sustainable supply chain management field through a systematic literature review. They found that “efforts to build upon the existing theories to develop new perspectives are scarce” (p.13). Thenty-five different theories applied in the SSCM field were identified in 136 out of 306 papers. The theories adopted most were resource-based view theory (RBV) and Transactional cost theory (TCT), which have been widely used to investigate the impact of SSCM or GSCM activities, or sustainability practices in the firm’s financial performance, or in the gain of competitive advantage. Stakeholder and institutional theories were also used to explain the drivers, enablers and barriers of the implementation of SSCM activities and sustainability practices.

Tachizawa and Wong (2014) also identified the organisational theories used to manage sustainability in the context of multi-tier suppliers. Social network was applied to describe contexts that affect the lead firm’s performance and a relational view was used to identify critical resources to approach suppliers and system

thinking (employed to understand the relationship with suppliers). Similarly to the finding of Tachizawa and Wong (2014) and Touboulic and Walker (2015), in the papers included in the systematic literature review (Chapter 2), 45 of them employed one or a combination of organisational theories. The most mentioned theories were RBV and stakeholders theory.

Interestingly, these most used theories listed by Tachizawa and Wong (2014) and Touboulic and Walker (2015) were previously identified by Sarkis et al. (2011) as theories that can describe the issues in GSCM field. Sarkis et al. (2011) also provided a list of promising organisational theories to enable further understanding of GSCM, including the diffusion of innovation theory (DoI) (Rogers, 2003).

DoI has generally been employed to explain an adopter's behaviour during decision making process when adopting an innovation (Frambach, 1993) and forecasting the future of adoption. In the context of supply chain management, DoI has been used to describe factors that affect the implementation of information technology (Russel and Hoag, 2004; Wu and Chuang, 2009), e-collaboration tools (e.g. direct procurement, replenishment, supply chain planning forecasting) (Chan et al., 2012) and post-adoption activities related to technological innovation (Hazen et al., 2012). In the context of sustainable supply chain, not differently DoI has been applied to understand the behaviour of potential adopters, explain mechanisms and to predict the adoption of an environmental practice and its performance outcomes. Further, DoI also helps firms to understand which industries are most likely to be affected by the growth of environmental practices and suppliers to anticipate the demands from buyers (Tate et al., 2012).

Testing and extending less popular theories can increase the maturity in the SSCM field (Touboulic and Walker, 2015). In addition, Zorzini et al. (2015) explained that a significant contribution to knowledge can be reached by the development of expertise and application of one specific theory. However, the existence of compatibility between the theory chosen and the phenomenon investigated is necessary in order to avoid losing validity (Boer et al., 2015).

The concept and core elements of DoI (Roger, 2003) will be presented in the next sub-section. This will be a base for understanding how DoI has been employed in the context of sustainable supply chain management (Section 4.4).

4.3 DEFINITION AND CORE ELEMENTS OF DOI

According to the diffusion of innovation theory (DoI), diffusion is "the process in which an innovation is communicated through certain channels over time among members of a social system" (Rogers, 2003, p.5). The diffusion theory, therefore, is made up of four main elements namely; innovation, time, communication channel and social system; which be described in the next subsection.

4.3.1 Innovation

An innovation is a practice, technology, or object that is perceived as new by a member of the social system. An innovation is also considered to be a new idea or a combination of existing ideas, which is shared with members through a communication channel in order to achieve a mutual understanding or goal.

Rogers (2003) suggested that the adoption of an innovation in a social system is affected by the members' perceptions of the five attributes of innovation; namely advantage, compatibility, complexity, trialability and observability. The first attribute covers the perception of the economic and social (e.g. prestige) benefits. For instance, the wish to gain social status by implementing an innovation is a considerable motivation for many members of a social system. In the same way, the innovation needs to be consistent with existing values, past experiences, norms and structure of the social system, and needs of potential adopters (compatibility). The next attribute relates to the elimination of the complexities to implement an innovation (e.g. difficulties to understand and use). The fourth attribute is about the chance to experiment on the innovation on a limited basis in order to reduce uncertainty. Finally, observability means having an innovation which is visible to others members of the system, acting as a trigger for the later adopter to implement an innovation.

The innovation element in the DoI has a broad definition. Firstly, it is made of different alternatives, such as an idea, practice, technology or object. Secondly, the alternative is considered a novelty by a member because it is new, although the alternative cannot be new in the whole system. Finally, the adoption of an innovation is driven by the perceived attributes of innovation, which demands a constant process of information exchanges in order to gain knowledge and to form the attitude before the implementation. These perceived attributes might accelerate the innovation-decision process as can been seen in the next subsections.

4.3.2 Time

The time element of DoI has two dimensions. The first is related to the time requested by the innovation-decision process. Overall, the decision process comprises five stages: knowledge, persuasion, decision, implementation, and confirmation (Figure 4.1, p. 56). The potential adopter starts from the initial seeking of knowledge about the practice, to the formation of the attitude toward the innovation (persuasion). At the persuasion stage, an understanding of the five attributes of innovation is developed (advantage, compatibility, complexity, trialability and observability). Then the decision is made to adopt or reject followed by the implementation. Finally, confirmation occurs when the adopter supports the innovation decision based on the performance achieved by the implemented innovation. Discontinuance can occur through replacement of the innovation in order to adopt a better practice, as well as disenchantment, which is the rejection of the innovation due to dissatisfaction with its performance.

The time element is therefore the length of time required for an adopter to pass through the innovation-decision process. Different types of decision in the social system can accelerate this process. A decision can be made based on an authority relationship, where a member in the system, who has power, imposes the implementation of an innovation on others. The decision to implement an innovation can also be made by a member independent of other members (Optional decision). Moreover, the decision can be made based on a consensus among members of the system (collective decision). Therefore, the type of decision can influence the time requested by the innovation-decision process.

Another factor that can accelerate the decision to implement an innovation is the priority given to solve problems or meet needs.

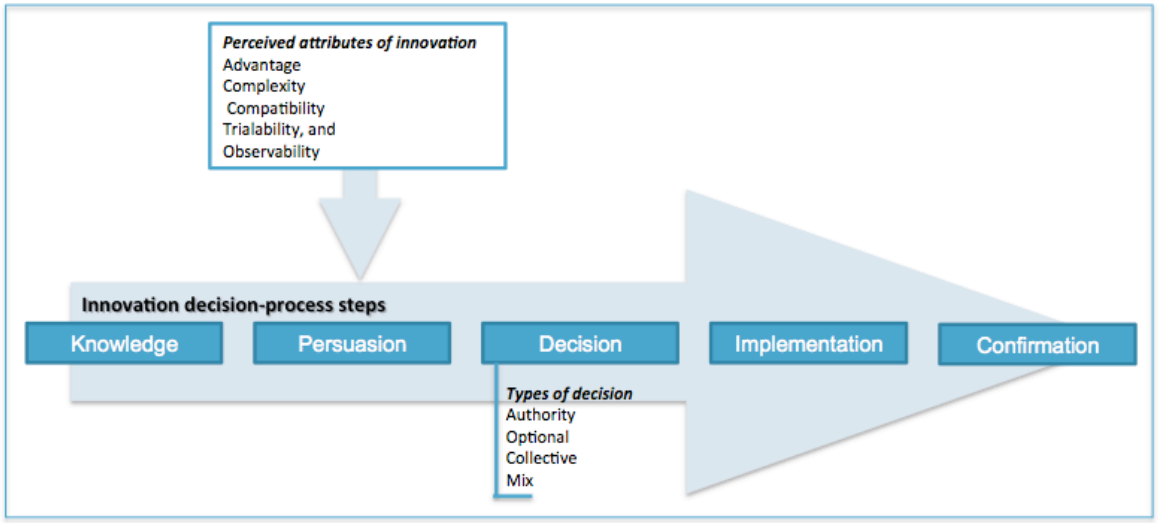


Fig. 4.1: Innovation-decision process. Source: Rogers (2003)

The second dimension is the rate of adoption, which is the length of time required for a certain percentage of members to implement a specific innovation. The potential adopters' perception of the five perceived attributes of innovation and the type of decision also affect the rate of adoption in a system. Critical mass is reached when sufficient members of the system implement an innovation.

Therefore, the time in the lens of DoI is measured in terms of the speed with which a member of the social system implements an innovation and how fast the innovation is implemented throughout the whole system. The time element can be affected by the priority given to solve problems, the types of decision and the perception of potential adopters on the five attributes of innovation.

4.3.3 Communication channel

The communication channel involves the information exchange between members of the social system regarding an innovation. This includes the mechanism by which interaction between members of the social system occurs.

The communication channels allow members to become aware of an innovation, to clarify and secure additional information about an innovation, as well as to reduce uncertainty. They are also useful for persuading members to change negative attitudes towards adopting a practice. Actually, this interaction can continue through the stages of the innovation-decision process.

The communication channel element is therefore related to the information exchanges, which affects the diffusion of an innovation across the system by sharing information, creating knowledge, persuading members to change their attitude forward the innovation and confirming its performance. Consequently, the

communication channel plays an important role in the innovation-decision process and affects the rate of practices implemented in the system.

4.3.4 Social system

The social system is a boundary within which an innovation is diffused. It is built up of members, norms and structure. The members are the interrelated units that are engaged in joint problem solving or to accomplish a common goal or meet a need. In general, the members include innovators, opinion leaders, later adopters and change agents (Figure 4.2). The innovator is responsible for developing and launching the new idea in the system. Opinion leaders are usually the early adopters of an innovation and consequently they have technical competence on an innovation. They are the most integrated members of the system and can provide information and advice about the innovation to their peers, including their followers, later adopters (e.g. early and later majority) and laggards. In general, the leaders conform to the system's norms and therefore it serves as a model for the innovation of potential adopters, exemplifying and expressing the system's norms. Therefore, they can be influential in the system by promoting a new idea among other potential adopters, including later adopters, which are the last in a social system to adopt an innovation. Finally, the change agents are specialised individuals (e.g. consultants) who seek to effect the adoption of an innovation in the system. They usually influence the potential adopters during the innovation-decision process, or even try to create a need by pointing out alternatives to solve problems and assuring the adopter that they are technically capable of solving it. The change agent often seeks to engage the leaders in the diffusion process in order to increase the rate of adoption. In addition, they frequently work on behalf governmental agencies to disseminate new practices or regulations in a social system. The key feature of the change agent is their knowledge of the innovation. In some cases, when there is no need of technical knowledge or assistance, the change agent is not necessary in the diffusion process. Interestingly, the leaders can play the role of a change agent with their peers, as well as an innovator.

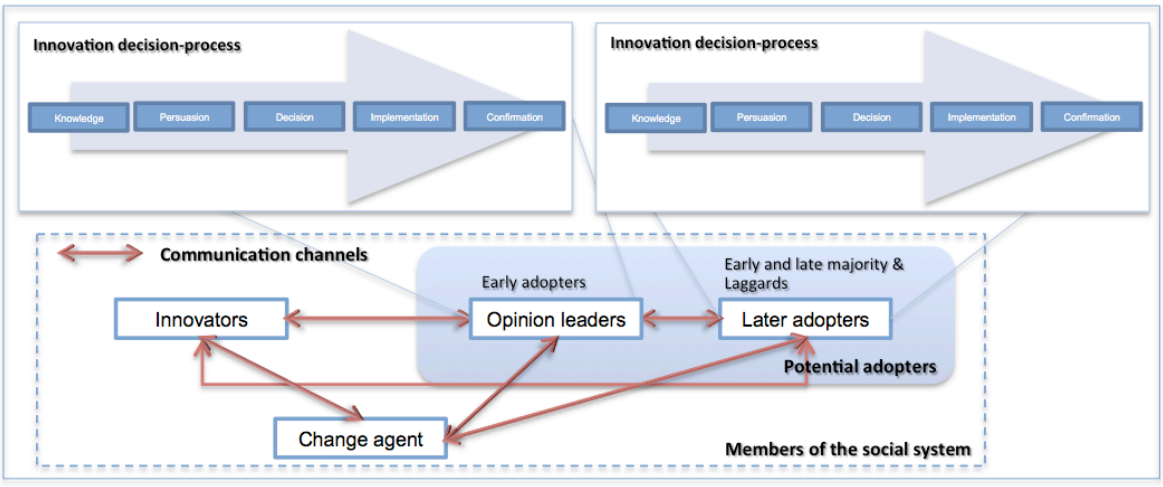


Fig. 4.2: Innovation process – members and communication channels. Source: Rogers (2003).

Norms are associated with the expected behaviour of members of the system as defined by Rogers, (2003, p.26) “Norms define a range of tolerable behaviour and serve as a guide or standards for the behaviours of members of a social system”. The incompatibility of an innovation with the norms of the system can block its adoption, for instance inconsistency with sociocultural value, religious aspects or non-conformity with laws and regulations.

The structure of the system is the patterned arrangements of the members in a system, which provides regularity and stability to behaviour in the system. The structure is made of the social and communication aspects. The first one is particularly useful to describe the relationship among the members of the system. This can describe aspects like hierarchical positions of members, types of decisions (e.g. authority decision, which is made by individuals in higher-ranked socioeconomic positions with power to influence). The communication structure in turn is recognised in the patterned communication flow in a system.

Therefore, the social system element provides the limits where an innovation can occur in accordance with the norms of the system. In addition, the influential members and potential adopters and arrangements between them are included in the social system element.

To sum up, the table 4.1 points out the elements of DoI and its key aspects. Fundamentally, the heart of DoI is in regard to the innovation-decision making process, which is affected by the perceived attributes of innovation, the level of information exchanges through the communication channel and the social system.

Table 4.1: Elements and aspects of the diffusion of innovation theory considered. Source: Rogers (2003)

Elements of Diffusion theory	Aspects considered
Innovation	*Alternatives* Idea, practices, object, and technologies. *Perceived attributes of innovation* Advantage, complexity, compatibility, trialability and observability.
Time	*Innovation-decision process* Knowledge, persuasion, decision, implementation, and confirmation *Rate of adoption* Speed in which an innovation is diffused across the social system.
Communication channel	*Information exchanges for creating, sharing knowledge and persuasion for attitude changes forward the innovation*
Social system	*Members* Innovators, opinion leaders, late adopters, and change agent. *Norms* Expected behaviour *Structure* Arrangements among members and communication flow.

4.4 DOI IN THE CONTEXT OF SUSTAINABLE SUPPLY CHAIN MANAGEMENT

The papers selected in the systematic literature review presented in Chapter 2, which adopted the diffusion of innovation theory as a theoretical background were selected and reanalysed. Nine papers applied DoI as a theoretical background and two only mentioned the existence of the theory without using it. The cited

references used in those papers were also tracking in order to increase the sample of papers to be assessed.

Hence, a few numbers of papers were identified, a similar search for peer-review papers in English were carried out on Scopus, Web of Science, EBSCO and ABI databases until February 2016. The key words “suppl*”, “supply chain”, “diffusion”, “diffusion of innovation” and “sustain*”, “environ*” were used as construct search strings with the Boolean connectors “and”. Title and abstracts were read in order to identify that contributed to the perspective of diffusion of sustainability practices from buyers to suppliers.

Few papers were found, but not selected due to not meeting the inclusion criteria. For instance, some papers did not use DoI as the background theory, only mentioned it neither in the research constructs (e.g. Tate et al., 2013) or focused on a different angle of application, such as the perception of potential users of reused and remanufactured products without linking to suppliers and manufacturers (Hazen et al., 2011). Likewise, nine papers, published between 2010 and 2013 were included in the analysis. Most of them adopted as methodology survey and were conducted in China by researches from management/business schools.

Overall, the application of DoI in the context of SSCM has given more attention to describe how fast (i.e. the rate of adoption) a particular sustainability practice or a set of practices were implemented by firms (Table 4.2, p. 61). However, most of the studies did not distinguish the adopter, i.e. buying firms (e.g. brands, OEM’s, retailers) or suppliers. This means that the studies did not establish the boundary of the diffusion, i.e. the social system. It is important to note that the sustainability practices, which are related to technology, resource and organisational management for the preservation of the natural resources and waste reduction, as well as the inducement of a social behaviour (Bolden et al., 1997; Hollos et al., 2012), are in line of the definition of innovation presented by Roger (2003). The author considered innovation as a practice that could be a novelty by a member of the social system.

In terms of the sustainability practices studied, this includes standards (e.g. ISO 14001 and ISO 26000), code of conducts and environmental practices (e.g. eco-labelling, technologies, eco-design, reverse logistics, environmental management). For instance, Zhu et al. (2012b) studied the diffusion of ISO 14001 and environmental label (Chinese programme) across Chinese firms. They found that the first adopters were industry leaders or multinational companies and the growth of the certification was justified by the implementation by “imitators” (late adopters). This is directly related to the attribute of observability. The organisational factor clear communication of sustainability requirements (OF9) was identified in this research as being critical for diffusion.

Zhu et al. (2012a) also investigated across the Chinese manufacturers (e.g. automotive, power generating, chemical/petroleum, electrical and electronic sectors) the adoption of environmental practices, such as eco design and reverse logistics. The support from top managers was the most influential factor in adopting environmental practices (OF4). Yet, according to the results, most of the firms were considering implementing the practices, or initiating the implementation. Even though the firms were in early stages of the decision-making process (decision and implementation), i.e. the firms did not confirm the benefits of the

implementation (last stage of the innovation-decision process – confirmation), the authors clustered the firms in three groups, namely early adopters, followers and laggards.

Castka and Balzarova (2008) provided a set of proposition regarding the diffusion patterns of ISO 26000 guidance standard across business organisations. They proposed multinational firms that adopted the standard would require the implementation in their supplier base (OF9). In this sense, suppliers would adopt it to compete for contracts and opportunities. Overall, the proposals were predicted to diffuse ISO 26000, given more emphasis on the perceived innovation attribute "advantage" as a driver.

Few papers focused on the role of buying firms in the diffusion or pay attention on the supplier's perspective in the adoption of sustainability practices as a response to buying firms. In these perspectives, the practices diffused were a code of ethics (driven by the need to manage all suppliers, setting principles) and lead-free soldering technology (driven by legislation). The diffusion mechanisms adopted by the buyers were certification, audit, awards and sanctions, collaborative approaches and training. Moreover, the attributes of innovation also received more care. For instance, Tong et al. (2012) investigated the behaviour of Chinese electronics producers in terms of the adoption lead-free soldering technology as a response to RoHS regulation, which is related to the use of certain hazardous substances in electric and electronic equipment promulgated in 2003. They focused on the rate of adoption and considered early adopters as firms that had implemented the new technology before 2003. In an example, the early adopter began the implementation with the support from a huge computer OEM. In general, it was found that the buyers were responsible for the self-announcement of compliance with the regulation of their products and in order to reduce risk they commonly request during the selection to suppliers to provide third-party certification to ensure compliance with the regulation of the components provided. For that, the clear communication of the sustainability requirements (OF9) was found as critical. Moreover, the engagement of stakeholders (OF6) was identified by the authors as influential for diffusion. Actually, the independent third party firms acted as the change agent in the system by providing tests and consultancy to suppliers to implement practices.

Schleper and Busse (2013) proposed a model for the diffusion of supply chain governance code based on a literature review and interviews with multi-stakeholders in different sectors and contexts (e.g. management consulting firms, large global auditing firms, apparel manufacturers, transportation and machine manufacturers). They identified the key factors that affect the adoption of codes, such as content and specificity of the ethical code, inclusion of stakeholders in the code design (sorted as OF6), quality of communication (sorted as OF9) and enforcement system (e.g. audits) (sorted as OF10 – Supplier evaluation). They assumed that these factors were influential on the adopter's perception of the innovation attributes specially compatibility with the norms of the system.

Table 7.3 (p. 61) presents the content analysis of the papers reviewed. The rate of adoption has received more attention. The types of adopters (early, late and laggard) have also been investigated and the organisational factor clear communication of the sustainability requirements (OF9) has been identified as being a critical factor for diffusion of practices.

Table 4.2: Analysis of the literature on the application of DoI in the sustainable supply chain management field.

Author/year	Research method	Sustainability practices studied	Perspective	Mechanism used	DoI elements covered	Organisational factors influential for diffusion
Castka and Balzarova (2008)	Literature review	ISO 26000	Buyers	-	Perceived attributes of innovation	OF9 (Supplier selection – implementation)
Zhu et al. (2010)	Survey	Environmental management, eco-design, and reverse logistics	Not specified*	-	-	OF3, OF4 and OF9 (Supplier selection – implementation)
Marimon et al. (2011)	Empirical – secondary data – List of companies certified	ISO 14001	Not specified*	-	Rate of adoption	OF9 (Supplier selection – implementation)
Carbone et al. (2012)	Literature review	ISO 14001 and code of conduct	Buyers	-	-	OF4 (Supplier selection – implementation)
Tong et al. (2012)	Survey	Lead-free soldering technology	Suppliers	Requesting certification, collaboration and training	Rate of adoption & early adopters	OF4 and OF5 (Supplier selection – design) OF6 and OF9 (Supplier selection – implementation) OF30 (Supplier development – implementation)
Zhu et al. (2012a)	Survey	Environmental management, eco-design, and reverse logistics	Not specified*	-	Rate of adoption & types of adopters (early, late and laggard)	OF4 (Supplier selection – implementation)
Zhu et al. (2012b)	Empirical – secondary data – List of companies certified	ISO 14001 and environmental label	Not specified*	-	Rate of adoption	OF9 (Supplier selection – implementation)
Schleper and Busse (2013)	Qualitative - interviews	Ethical codes	Buyers and suppliers	Communication of the codes and suppliers' evaluation against the codes	Perceived attributes of innovation	OF6 and OF7 (Supplier selection – design) OF9 and OF10 (Supplier selection – implementation)
* It was not distinguished in the sample studied the position of the firm in the supply chain, i.e. if they were focal firms, other buyers or suppliers.						

4.5 SUMMARY OF THE CHAPTER

This chapter presented a content analysis on how the diffusion of innovation theory (Roger, 2003) has been employed in sustainable supply chain management field. The analysis revealed that more emphasis on how fast a sustainability practice (rate of adoption – time element of DoI) is spread across supplier base has been paid in the literature. The organisational factor clear communication of the sustainability requirements (OF9) has also been identified as being influential in the diffusion of practices.

Other elements of DoI and the perspectives of application need to be incorporated in the literature to enhance the discussion on the diffusion of sustainability practices across the supplier base. For instance, the communication channels used by the lead firms to influence suppliers in the implementation of sustainability practices. Lead sustainability firms play a crucial role in the diffusion of sustainability practices across their supplier base (Castka and Balzarova, 2008; Tong et al. 2012; Schleper and Busse, 2013).

The communication channel is a critical element, which affects the diffusion process (Roger, 2003), i.e. the implementation of sustainability practices by suppliers. Zhu et al. (2010) and Schleper and Busse (2013) suggested that future research could investigate more the diffusion mechanisms adopted by buyers. It is important to emphasise that these mechanisms act as the communication channels to lead sustainability practices to suppliers. Understanding the nature of communication flow is enhanced by the norms and structure of the social system. The norms and structure of the social system could be also focused.

Therefore, DoI is chosen as a background lens in this research considering its power to explain a phenomenon and add richness for the analysis of the findings. The sustainability practices are considered the innovation element of DoI (practices such as technologies, resource and organisational management). Besides the innovation element, communication channel, time and social system will be considered in chapter 7 by analysing the organisational factors identified in chapter 3 against the DoI elements.

CHAPTER 5
Research Methodology

5.1 INTRODUCTION

This chapter presents the research design and the empirical design. The research design involves the selection of an underlying philosophical position, a methodology choice and suitable research methods used to collect and analyse data. The rationale behind the choices is justified. In the empirical design, elements, like sampling, data collection and analysis and quality criteria, are discussed.

As stated in Chapter 1, this research belongs to the academic field of supply chain management and explores the sustainability practices diffusion. The aim of this research is to establish the conditions for enhancing the diffusion of environmental and social sustainability practices across the supplier base from the buying firms' perspective. A theory building strategy is employed. This is efficient in the development of academic fields and is needed for the applicability to real world problems (Wacker, 1998). It seeks to find similarities across many different domains to increase its importance. The main reason for selecting theory building is the lack of existing theory explaining diffusion of environmental and social sustainability practices within the supplier base.

The next section will focus on the research design.

5.2 RESEARCH DESIGN

Following Grix (2002), this section addresses the philosophical position (5.2.1), methodology choice (5.2.2) and research methods (5.2.3). This author believed that these were the key interconnected building blocks of research.

5.2.1 Philosophical position

Awareness of philosophical assumptions can both increase the quality of research and contribute to the creativity of the researcher (Easterby-Smith et al., 2012). The authors considered that most traditional debates related to the philosophical position concern matters of ontology (views on the nature of reality) and epistemology (i.e. views about the ways of enquiring into the nature of the world).

This research addresses the ontological and epistemological assumptions presented by Bryman and Bell (2007), who are two of the most followed authors in the field of supply chain management in terms of philosophical assumptions and methodology. Ontology relates to what was studied and then fed into the formulation of the research questions and how the research was conducted.

Epistemology in turn regards “questions of what is (or should be) regarded as acceptable knowledge in a discipline” (p.15). They provided an analysis of four positions: on the one hand, in the ontological position, objectivism and constructionism; on the other hand, in the epistemological position, positivism and interpretivism. A brief description is presented below:

- Objectivism – social phenomena and its meanings have an existence that is independent of social actors. Standardised procedures are frequently used;
- Constructionism – social phenomena and its meanings are influenced by social actors;
- Positivism – imitation of natural science to the study of social reality by applying methods of the natural science and generating and testing hypothesis;
- Interpretivism – human interactions and perceptions, which contrast with the subject matter of natural science. Social scientists need to understand the subjective meaning of social action.

According to Grix (2002) ontology is frequently collapsed together with epistemology. They need to “be kept separate providing a view of the world which itself is shaped by the experience one brings to the research process” (Grix, 2002, p. 179). The nature of the ontological assumptions is influential for epistemology, i.e. how to have warranted knowledge about what is studied.

Likewise, this research follows the constructionism positions (ontology) and the interpretivism (epistemology) and. It is important to note that the nature of this research is to understand the real-world phenomenon of diffusion of environmental and social sustainability practices across supplier base from the buyer’s perspective. Therefore, the philosophical assumptions addressed fit this research. Interestingly, Easterby-Smith et al. (2012) stated the constructionism aimed to increase general understanding of a situation by gathering rich data from which ideas are induced. Multiple data sources are acceptable.

5.2.2 Methodological choice

Robson (1993) defines methodology as a scientific background to social research and the implications for the use of a particular research method. This relates to the logic scientific inquiry, which reflects specific ontological and epistemological assumptions (Grix, 2002). According to the latter author, whereas ontology is driven by the question “what’s out there to know?” and epistemology “what and how can we know about it?”, methodology is defined based on the question “how can we go about acquiring that knowledge?”.

This PhD research is mostly guided by the RQ1 - How are environmental and social sustainability practices diffused across the supplier base? It should be noted that this research question is also related to the research questions RQ2 (What sustainability practices are diffused through the supply chain management?), RQ3 (What are the influential organisational factors in the supply chain management activities for diffusion of environmental and social sustainability practices?) and RQ4 (How do organisational factors affect the diffusion of sustainability practices across the supplier base?), which in general focused on what and how questions on sustainability practices and influential factors on their diffusion. Likewise, the methodology chosen for this research is

inductive qualitative approach for building theory. This choice is justified based on the following points:

- Constructionism and interpretivists tend to use more qualitative approaches (Bogopane, 2013; Easterby-Smith et al., 2012);
- qualitative research "predominantly emphasises an inductive approach[3] to the relationship between theory and research, in which the emphasis is placed on the generation of theories" (Bryman and Bell, 2007, p. 27). This research employed a theory building approach;
- it allows researchers to gain a holistic (systematic, encompassing, and integrated) overview of the context under study, which is conducted by intense and/or prolonged contact with participants (Miles et al., 2014).

5.2.3 Research methods

The research methods are techniques or procedures used to collate and analyse data and are inextricably connected with the research questions postured and to the sources of data collected (Grix, 2002). Based on that, considering the philosophical assumption and the qualitative approach chosen, as well as the research questions that this research addresses, the inductive case study method was selected.

Case study is an important qualitative research which is based on an in depth analysis of a single or multiple cases over a period of time (Bogopane, 2013). According to Yin (2014), the case is a contemporary phenomenon studied using in-depth inquiry within its real-word context. Voss et al. (2002) considered this method as one of the most powerful research methods, principally in the building of new theory.

Taking into consideration RQ1 (How are environmental and social sustainability practices diffused across the supplier base?) and RQ4 (How do organisational factors affect the diffusion of sustainability practices across the supplier base?), which are addressed in the knowledge and contribution steps of this research (more specifically chapter 6 as presented in Figure 1.2, p.6), the case study method fits these research questions. According to Yin (2014, p.11) "how questions are likely to favour using a case study". The author stated that each question faced operational links which requested to be studied over time.

Constructionist studies are based on direct observations and personal contacts, for example through interviews (Easterby-Smith et al., 2012). This study was conducted based on the buying manufacturing firms' perspective and the researcher acted externally to this phenomenon (sustainability practice diffusion through buying firms) and did not have control over the behavioural event. This lack of control over events also makes the case study better fit this research (Yin, 2014). Actually, this eliminates the used of controlled experimentation, for example procedures used in laboratory experiments (McCutcheon and Meredith, 1993).

In order to increase generalizability and confidence, a multiple-case study was also adopted (Miles et al., 2014). Eisenhardt and Graebner (1989) argued

[3] It is strategy by which theory is generated by research (e.g. findings from observations) (Bryman and Bell, 2007).

that multiple case studies were critical for building theory strategies, hence it often emphasised complementary aspects of a phenomena and corroborated specific preposition, which enabled the distinguishing of patterns.

Eisenhardt and Graebner (1989) suggested that all case studies should be guided by clear research questions and a well-designed instrument to collect data. Following this logic, the research questions and the conceptual framework also guide the empirical design (Figure 5.1), which will be presented in the next section. It should be noted that the theoretical study steps (chapters 2, 3 and 4) were driven by the research questions RQ2 (What sustainability practices are diffused through the supply chain management?) and RQ3 (What are the influential organisational factors in the supply chain management activities for diffusion of environmental and social sustainability practices?). Based on that, a systematic literature review was carried out according to Tranfield et al. (2003) and Denyer and Tranfield (2006). As presented in chapter 2, this method has been used significantly in the recent years in research on sustainable supply chain management (e.g. Ahi and Searcy, 2013; Brandenburg et al., 2014; Govindan et al., 2015; Wong et al., 2015) (please also see appendix A). The key concepts related to SSCM and sustainability practices identified in chapter 2 and influential organisational factors for sustainability practices diffusion identified in chapter 3 were used to generate a conceptual framework. This interpretative approach is used in this research to map and understand the diffusion of sustainability practices across the supplier base (Jabareen, 2009; Miles et al., 2014). Indeed, conceptual frameworks describe the phenomenon accurately and explain how it occurs (Meredith, 1993) and can permit an eventual cross-case analysis (Miles et al., 2014).

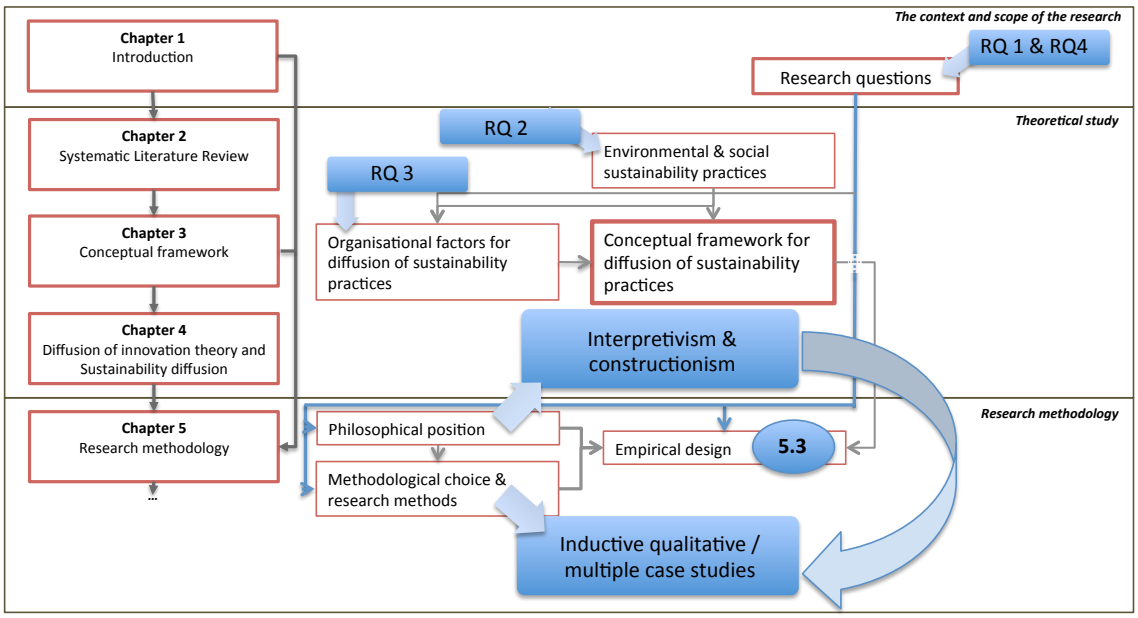


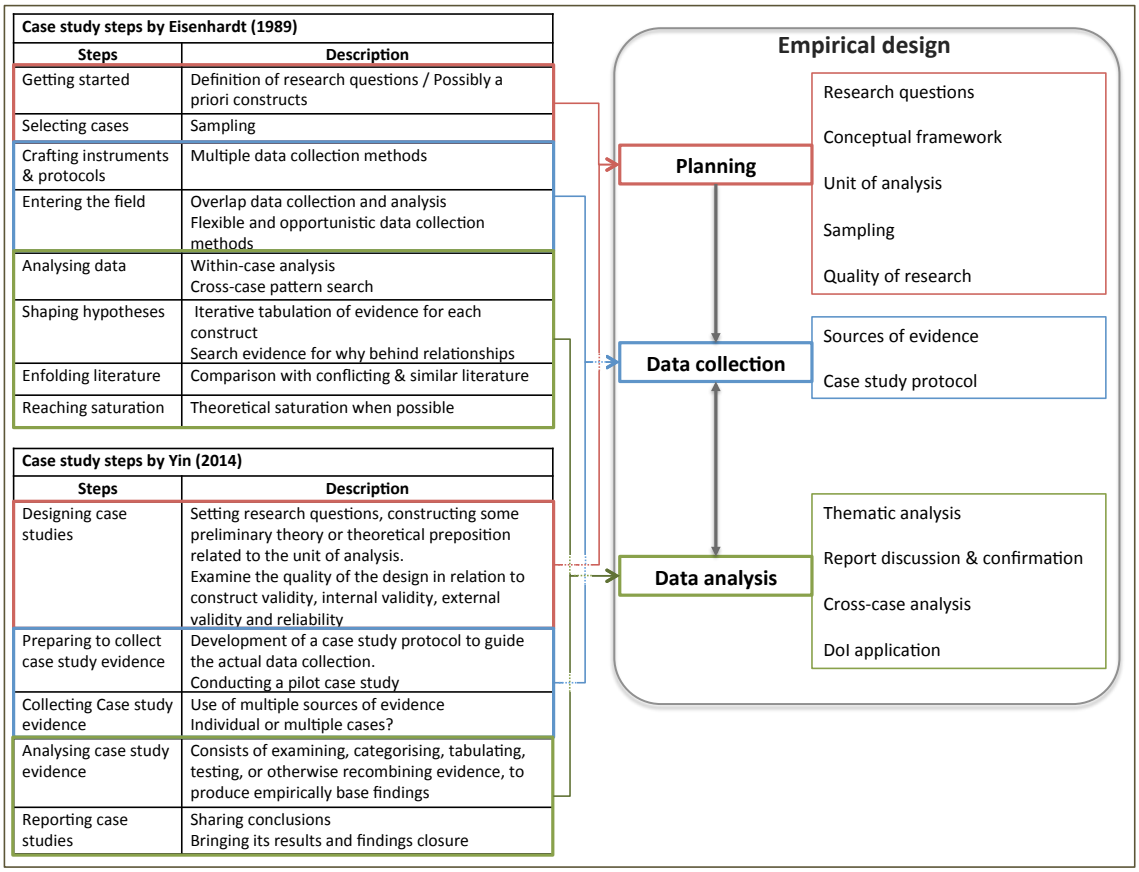
Fig. 5.1: Key building blocks of research.

The real-world phenomenon of diffusion of environmental and social sustainability practices across supplier base from the buyer's perspective is a complex and contemporary phenomenon with few existing theories. This research addresses this problem by employing an inductive quality approach for

building theory. Based on this philosophical assumption and the qualitative approach chosen, case study was therefore considered as the most appropriate empirical method. Case study is particularly advantageous in dealing with an under-researched phenomenon (Meredith, 1998; Yin, 2014). It is a case-based theory-building method that provides strong novelty, testability and empirical validity (Eisenhardt, 1989). The case studies in this research were based on multiple data collection methods, including interviews, documents and observations. This will be explained in the next section.

5.3 EMPIRICAL DESIGN

This section relates to the data collection and analysis. As defined in the last section, the multiple case study method was chosen. Eisenhardt and Graebner (1989) and Yin (2014) are one of the best well known authors on case study methods (Easterby-Smith et al., 2012). They presented a step-by-step approach for carrying out case studies, which is presented in Figure 5.2. There are some overlaps and common features adopted by the authors, such as using/setting research-questions and constructs and sampling. Based on those authors the empirical design was set out, considering as the steps – planning, data collection and data analysis, which will be presented in the next subsections.



Case study steps by Eisenhardt (1989)

Steps	Description
Getting started	Definition of research questions / Possibly a priori constructs
Selecting cases	Sampling
Crafting instruments & protocols	Multiple data collection methods
Entering the field	Overlap data collection and analysis Flexible and opportunistic data collection methods
Analysing data	Within-case analysis Cross-case pattern search
Shaping hypotheses	Iterative tabulation of evidence for each construct Search evidence for why behind relationships
Enfolding literature	Comparison with conflicting & similar literature
Reaching saturation	Theoretical saturation when possible

Case study steps by Yin (2014)

Steps	Description
Designing case studies	Setting research questions, constructing some preliminary theory or theoretical preposition related to the unit of analysis. Examine the quality of the design in relation to construct validity, internal validity, external validity and reliability
Preparing to collect case study evidence	Development of a case study protocol to guide the actual data collection. Conducting a pilot case study
Collecting Case study evidence	Use of multiple sources of evidence Individual or multiple cases?
Analysing case study evidence	Consists of examining, categorising, tabulating, testing, or otherwise recombining evidence, to produce empirically base findings
Reporting case studies	Sharing conclusions Bringing its results and findings closure

Fig. 5.2: Empirical design.

5.3.1 Planning

This empirical design step encompasses three elements, research questions, the conceptual framework, unit of analysis and sampling.

5.3.1.1 Research questions and conceptual framework

The definition of research questions is important in building theory from case studies and provides focus thereby avoiding becoming overwhelmed by the volume of data (Eisenhardt, 1989). The authors also stated that it was also important to establish variables with some reference to the current literature. This preliminary theory related to the phenomena investigated is also critical for defining the appropriate data to be collected (Yin, 2014).

Likewise, the research questions RQ1 (How are environmental and social sustainability practices diffused across the supplier base?), RQ4 (How do organisational factors affect the diffusion of sustainability practices across the supplier base?) and RQ5 (How can sustainability diffusion across the supplier base be enhanced - buyer perspective - based on the diffusion of innovation theory?) were considered.

The conceptual framework presented in chapter 2 established the variables to be studied (Please see table 3.7, p. 51). This is related to the influential organisational factors that affect the diffusion of sustainability practices across the supplier base through the supplier selection, performance assessment and development. As before, this framework was built based on a systematic literature review, which is seen as a foundation of evidence-based approaches to generate an unbiased comprehensive account of the literature in relation of the field investigated (Bryman and Bell, 2007).

It is important to note that RQ5 drives the application of the diffusion of innovation theory and will be explained in the data analysis. Therefore, the empirical stage of this research was designed to investigate the key themes identified in the literature, which is shaped in the conceptual framework and in line with the research questions.

5.3.1.2 Unit of analysis

The unit of analysis relates to the fundamental question of what a case refers to, which is pivotal to the accurate specification of research questions (Yin, 2014). The unit of analysis adopted in this study is the diffusion of environmental and social sustainability practices across the supplier base. Diffusion captures the notion of firms engaging suppliers with environmental and social sustainability practices. The diffusion is considered from a buying firm’s perspective.

5.3.1.3 Sampling

The definition of entities to be studied as an important aspect of buying theory from case studies, hence it defines the limits for generalizing the findings (Eisenhardt, 1989). The authors suggested that it was necessary to employ a transparent process to concentrate effort on theoretically useful cases, those

that replicate or extend theory by filling conceptual categories (Eisenhardt, 1989).

Miles et al. (2014) emphasised that the samples tended to be more purposive rather than random. In this sense, the authors suggested to take into consideration the research questions and conceptual framework in order to check if the cases are proper for providing evidence and answering the questions. These helped researchers to set the foci and boundaries for sampling decisions. In addition, the use criteria like comparable cases and reputational cases were recommended.

This research focuses on manufacturing firms. The ecological footprint of products and services is not limited to the production stage of the final product manufactured (Nawrocka *et al.,* 2009). In fact, all stages of the product lifecycle have influence on the environmental burden of a supply chain, including resource extraction, manufacturing, use, reuse, recycling or final disposal (Zhu et al., 2007). Manufacturing firms have also faced problems related to the supplier's behaviour. For example, Mattel carried out a recall of 20 million children's toys in 2007 due to materials found to contain traces of lead used by some suppliers (Gimenez and Tachizawa, 2012). Therefore, the responsibility of the manufacturing firms now spreads over a number of actors along the supply chain. Indeed, manufacturing firms have a pivotal role in enhancing suppliers' behaviour, performance and capabilities related to sustainability.

The first and most important criteria for engaging firms in the research were that they needed to be a manufacturing firm with robust sustainability credentials (both environmental and social sustainability practices implemented) (reputation criterion) (Miles et al., 2014) and provide empirical evidence for the research questions and conceptual framework (Eisenhardt, 1989; Miles et al., 2014; Yin, 2014).

Moreover, the criteria below set out elements related to accessibility of sources of evidence. Interestingly, similar criteria were adopted by Pagell and Wu (2009).

- Accessible to various level of employees;
- Accessible to different organisational functions, which interacts with suppliers (e.g. purchasing, R&D, operations, sustainability);
- Availability of documents related to sustainability and supply chain management (e.g. sustainability reports, supplier's sustainability audit reports, contracts, bill of materials, etc.).

Therefore reputation and more importantly accessibility (to people, documents, time) and the opportunity to observe how sustainability practices are diffused were the main criteria adopted to select firms for the case studies.

Manufacturing firms, which are members of the EPSRC Centre for Industrial Sustainability[4], were initially approached. Moreover, some firms that the researcher had contacted were also contacted. A total of nine firms agreed to participate in the research. Even with a strong reputation for sustainability

[4] <http://www.industrialsustainability.org/>. The centre is made of 4 Universities - Cambridge, Cranfield, Imperial College, and Loughborough - with a track record of success in the core elements needed in sustainable manufacturing. This is based on a strong collaboration with industries. The author is a researcher of the centre.

activities covered in the framework (supplier selection, performance assessment and development). They only requested certification or isolated examples of collaborative approaches were identified, providing poor evidence for the research. Moreover, difficulties to interview more than one manager or access documents for triangulation, therefore insufficient data, were another reason for not including the case in this thesis (accessibility). However, some of them have the potential to be used in future papers.

A final set of four sustainability leading manufacturing firms were included in the sample. These four firms provided depth evidence for the research protocol, especially for semi-structured interview protocol and analysis of documents. They are from beverage (soft drink and coffee), cosmetics and textile sectors. A similar sampling with diverse industries was taken by Klassen and Vereecke (2012) and Srai et al. (2013). The reputation of these four firms and more importantly accessibility (to people, documents, time) and the opportunity to observe how sustainability practices are diffused were the main criteria adopted to select firms for the case studies. Interestingly, from the 16 papers of out 140 papers selected in the SLR (Chapter 2), which employ case study in diverse industrial sectors (please see table 2.2, p. 13), the majority of them focused only on environmental practices.

Eisenhardt (1989) suggested that it was difficult to generate theory with much complexity with fewer than four cases; hence the empirical foundation was likely to be unimpressed. The author in another paper also considered that more important than the actual number of cases was how much is known and how much information would be learned from other cases (Eisenhardt, 1991). This relates to the theoretical saturation which is achieved when marginal improvements become small (Eisenhardt, 1989). Therefore, the four cases conducted in this research reached sufficient data to generate empirical evidence to meet the research aim and objectives. Subsection 5.3.2 will provide details on the data collection.

5.3.1.4 Quality criteria for evaluating of case study research

Yin (2014) suggested four criteria widely used for testing the quality when doing case study research. These criteria are presented in Table 5.1. These criteria have been considered in carrying out this research.

Table 5.1: Quality criteria for case study. Source: Yin (2014).

Criteria	Key features
Construct validity	Identifying correct operational measures for the concepts being studied. Use multiple source of evidence Establish chain of evidence Have key informants review draft case study report
Internal validity	Do pattern matching Do explanation building Address rival explanations Use logical model
External validity	Defining the domain to which a study's findings can be generalised Use replication logic in multiple-case studies
Reliability	Use case study protocol Develop case study database Demonstrating that the operations of a case study – such as the data collection procedure can be repeated, with the same results.

5.3.2 Data Collection

This research looked for confirmatory evidence (i.e. evidence from two or more different sources) in order to increase the quality of research (Yin, 2014). Several data sources were established and the data collection was guided by the case protocol, which are discussed in this topic.

5.3.2.1 Source of evidence

A case study usually employs multiple data collection methods. Multiple sources of evidence increase the quality of research (Yin, 2014). This also allows triangulation of evidence which supports grounding theory (Eisenhardt, 1989). Examples of these, semi-structured interviews (interview tool is updated based on emerging data), observations (e.g. plant tour) and archival sources (e.g. documents) have been widely employed (e.g. Barratt et al., 2011; Eisenhardt, 1989).

These sources of evidence were adopted in this research and will be described below:

- ***Interviews***

Interviews are a highly efficient method to gather rich and empirical data. Using numerous and highly knowledgeable informants mitigates bias (Eisenhardt and Graebner, 2007). They provide information that captures an understanding of the phenomenon studied (interviewee's perspective) (Easterby-Smith et al., 2012).

Managers from purchasing, operations and R&D are usually involved in supply chain management activities (Lippmann, 1999; Pagell and Wu, 2009). Likewise, these managers were targeted for semi-structured interviews. To guide this, a semi-structured interview protocol with open questions was adopted (Appendix C). A pilot interview protocol was carried out in order to increase the clarity of wording. This was done by asking opinion of experts (researchers and practitioners of EPSRC Centre for Industrial Sustainability) and by interviewing some procurement and sustainability managers of firms, which are member of the centre.

Interview protocol addresses questions on fairly specific topics (Bryman and Bell, 2007). Indeed, the protocol was designed in line with the research questions and conceptual framework, covering:

- Firm's sustainability credentials (e.g. sustainability practices implemented and drivers);
- Relationship with suppliers (e.g. building a long-term relationship, sustainability issued faced, internal functions involved in the relationship);
- Supplier base (e.g. material and industrial suppliers were mapped; location of suppliers, criticality);
- Supplier selection (e.g. design and implementation of requirements);
- Supplier performance assessment (e.g. design and implementation of supplier sustainability performance assessment);
- Supplier development (e.g. design and implementation of supplier sustainability development);
- The role of other functions (e.g. role in the engagement of suppliers on sustainability, enablers, motivations).

A total of 30 interviews in the four firms studied were conducted between 2014 and 2015 (Table 5.2). Interviews typically ranged from forty-five minutes to two and half hours in duration.

Table 5.2: Firms' features and sources of evidence

Firm	Main products	Location	Sources of evidence		
			Interviews	Documents	Observation
"Beverage A"	Soft drinks	UK	- Sustainability director, - Purchasing manager & - Environmental manager	- Sustainability strategic plan; - Sustainability reports; - Code of ethics; - Supplier's contract template; - Supplier sustainability programme; - Firm's online newspaper; & - Power point slides sustainability webinar for suppliers.	Two facilities visited in a total of two full day on site
"Beverage B"	Coffee	Italy	- Total quality director; - Procurement director; - Coffee procurement director; - P&D director; - Green coffee senior manager; - Environmental manager; - Energy manager; - Corporate communication senior manager; & - P&D analyst.	- Sustainability reports; - Supplier's contract template; - Firm's online newspaper; - Environmental questionnaire for supplier evaluation and assessment; - Green coffee growers checklist; - Best practices handbook; & - EMS manual.	Four full day on site
"Cosmetics A"	Cosmetics, perfumes, & personal care products	Brazil	- Supplier relationship & performance manager; - Biodiversity ingredients supplier relationship & performance manager; - Recycled material manager - Procurement manager; - Audit manager; - Sustainability manager; - P&D manager (processes)*; - P&D manager (bioprospection)*; - P&D manager (sustainability practices).	- Sustainability strategic plan; - Sustainability reports; - GRI index; - Supplier Code of conduct; - Supplier guideline manual; - Assessment tool for ingredients suppliers; - Assessment tool for industrial suppliers; - PPT slides for training (supplier sustainability Programme); - UEBT annual public reports; & - Policy of sustainable use of biodiversity	Two full day on site
"Textile A"	Sport clothes	Nether-lands	- Global CSR manager; - Sourcing manager; - Product development manager; - CSR analyst; - Sourcing analyst; - Supplier level *Garment supplier (Indonesia)** - Owner; - Managing director - Merchandising *Fabric supplier (China)** - Marketing director	- Sustainability reports; - GRI index; - Code of conduct; - Environmental policy; - Policy of engagement; - Supplier's contract template; - Manufacturing manual; - Suppliers audits reports; - Material bill; & - LCA report.	Five full day on site

* Through Skype call

- ***Documents***

Documents consist of a secondary data source, which are often of high quality (e.g. reports published by firms). This is usually used for complementing primary data sources (Easterby-Smith et al., 2012).

This research focused on archival sources (e.g. contract template, supplier audit reports, material bills, LCA/Carbon footprint reports, EMS manuals) and public documents (e.g. annual sustainability report, firms' newspaper) (Table 5.2).

- ***Observations***

"The objective of participant observations is to produce reliable and useable data" (Bogopane, 2013, p. 223). Robson (1993) stated that data from observation can contrast and complement other data collected. In this research, during the fabric tour in the firms studied, it was possible to know the manufacturing process and how the materials supplied were managed. Moreover, the integration of different departments for managing suppliers was also observed. Finally, it was possible to identify sustainability practices implemented by the firms, including energy efficiency programmes, certifications (e.g. ISO 14001/EMAS) and labour practices (Table 5.2). In general, the activities for collecting data, including interview, fabric tour, analysis of archival sources ranged from two to five days in duration.

5.3.2.2 Case study protocol for data collection

Yin (2014) defined case study protocol was a way to increase the reliability of the research. This guides the research on how to carry out the data collection. The steps presented below were adopted in order to ensure reliability in the data collection process:

- Analysing sustainability reports in order to familiarise with sustainability practices implemented, process and materials, sustainable supply chain management (e.g. supplier base, engagement of suppliers for sustainability, sustainability in the supplier selection, performance assessment and development);
- Identifying potential managers to be interviewed with the initial contact manager;
- Arranging interviews and the fabric visits;
- Interviewing according to the semi-structured interview protocol;
- Fabric/office visit tour (observation – confirmation of interviews and documents analysis);
- Analysing of archival sources in loco when not shared (e.g. contract).

It is important to note that this research also addressed some ethical issues, including confidentiality (e.g. agreement with the firm about what will be done with the data) and anonymity (e.g. lack of identifiers) (Miles et al., 2014).

5.3.3 Data Analysis

The data analysis consists of the processes adopted to examine evidence, to produce empirically-based findings (Yin, 2014). This is “the heart of building theory from case studies” (Eisenhardt, 1989).

The cases were initially analysed individually in order to identify empirical pattern through the theoretical lenses presented in chapter 3 (conceptual framework). The interviews were transcribed and analysed based on a content analysis. An example of transcript is presented in Appendix D. This analysis followed Miles et al. (2014) and Yin (2014) guidelines on tabulating, displaying and analysing data obtained from the interviews, document analysis and observations. Triangulation of different evidence was also used to determine consistent findings (Bryman and Bell, 2007; Yin, 2014).

A report was sent to the firm, presenting the key findings (e.g. patterns related to sustainability practices diffused, factors affecting the diffusion of the practices) and recommendations. In general, the manager, who was initially contacted, and other managers with direct duties related to the supply chain management activities, were interested in feeding back about the report. This was made through on-going calls in order to try to answer the questions 1) to what extent do you agree with the report/conclusions? 2) is there anything significant that the report/conclusions brings out that you didn't think about before? and 3) is there anything significant you believe has been missed?. These validation processes are in line with quality criteria presented in Table 5.1 (p. 70).

Then, a cross-case analysis of the findings was conducted in order to identify patters and make comparisons across the cases regarding the organisational factors identified and sustainability practices diffused by the firms studied. This was supported by the analysis of the literature (conceptual framework). According to Eisenhardt (1989), enfolding literature helps to build internal validity, raise theoretical level and sharpens generalizability. Indeed, cross-case analysis allows the patterns from the detailed findings to be compared and contrasted (Barratt et al., 2011). This can allow developing more sophisticated descriptions and more powerful explanations for what is studied (Miles et al., 2014). In addition, the authors considered that cross-case analysis enables to enhance generalizability or transferability to other context.

As a result, this analysis provided a broad understanding of the organisational factors affecting the diffusion of environmental and social sustainability practices across the supplier base. Then, driven by the research question RQ5 (How can sustainability diffusion across the supplier base be enhanced - buyer perspective - based on the diffusion of innovation theory?), the empirical findings were analysed with the lens of diffusion of innovation theory (Roger, 2003), in particular the elements communication channel, social system and time. This application sought to provide consistent empirically-generated theory to diffuse environmental and social sustainability practices across the supplier base (contribution to the knowledge) (Figure 5.3, p. 75).

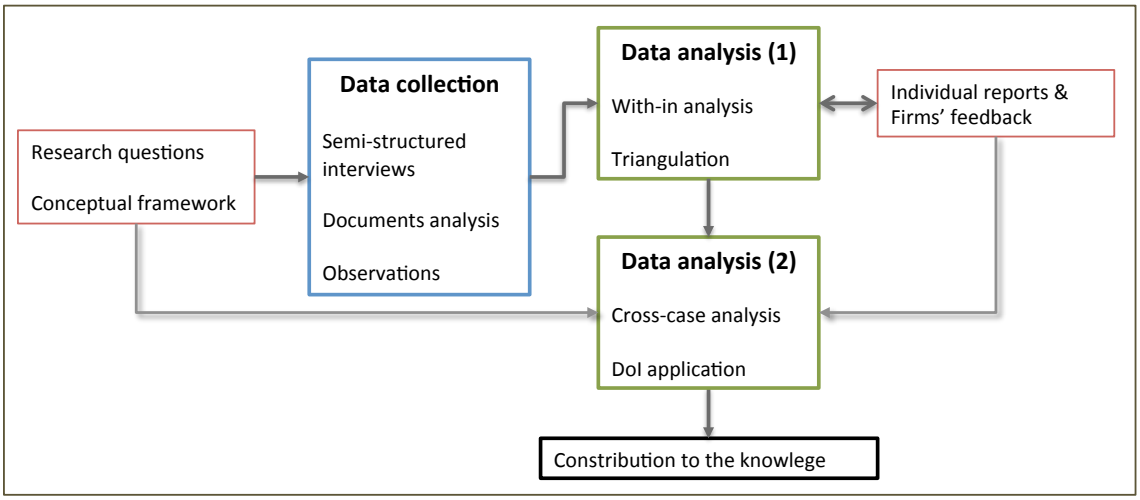


Fig. 5.3: Data analysis process.

5.4 SUMMARY OF THE CHAPTER

This chapter has presented the philosophical position, methodological choice and research methods and the empirical design. The research design is based on a theory building strategy which follows the interpretivism (epistemology) and constructionism assumptions (ontology). An inductive qualitative methodology through multiple case studies is employed.

The criteria used to select firms and to conduct the data collection and analysis were discussed. In addition, issues of validity and reliability were also introduced to ensure robustness and quality.

6.1 INTRODUCTION

This chapter presents the data analysis from a series of four cases in manufacturing companies. The findings for each case are presented individually in line with the empirical design (Chapter 5). The first and the second case studies were conducted in the beverage sector. The third case was carried out in a cosmetic firm. Finally, case 4 focused on a sport textile brand, including data from suppliers in the 1st tier (garment) and 2nd tier (fabric suppliers).

These case studies give an in-depth understanding concerning how environmental and social sustainability practices are disseminated. This provides insights into the practices diffused, mechanisms/initiatives adopted for diffusion and organizational factors previously mapped in the chapters 3 and 4. Furthermore, in terms of the factors, their impact is investigated, verifying the existence, completeness, and applicability (e.g. how and where they are important) of potentially new ones. Therefore, this chapter addresses the research questions RQ1, RQ3 and RQ4:

(RQ1) How are environmental and social sustainability practices diffused across the supplier base?

(RQ4) How do organisational factors affect the diffusion of sustainability practices across supply chain?

6.2 CASE STUDY 1 – "Beverage A"

6.2.1 Brief company description

The firm, called "Beverage A" here, is a bottler of soft drinks with more than ten manufacturing operations facilities in Europe. All sites are certified by ISO 14001 and most of them have also achieved the energy management standard (ISO 50001). There is competition between the manufacturing sites for the best performance (e.g. energy efficiency and water usage) and the constant sharing of best practices, which drives improvements across the facilities. The firm has also conducted carbon footprint studies and conducted a water footprint (ISO 14046 standards).

"Beverage A" launched the 2020 sustainability plan in 2011, which sets out its sustainability vision, commitments and targets and demonstrates how the business will grow and take into consideration sustainability issues. It addresses three core strategic priorities: demonstration of best practices, leading the industry in energy and climate change, sustainability packaging and recycling, as well as innovation through collaboration and partnership. The design of the plan was based on an engagement with a wide range of stakeholders, including academics, customers, NGO's, communities, suppliers, shareholder and employees. The plan aligns the stakeholders' expectations to the key firm's commitment. For instance, climate change is one of the key stakeholders'

concerns identified during the discussions and is addressed in the commitments. As a consequence, Beverage A has reduced its greenhouse gas emissions by implementing energy-efficient technologies, improving the logistics system - storage and distribution and using renewable and low-carbon energy (approximately 5.5%). The sustainability plan also influences the relationship with suppliers, addressing specific commitments (Table 6.1).

Table 6.1: 2020 Sustainability plan – commitment and targets that address suppliers.

Commitment	Target	Supplier engagement
Energy efficiency & climate change	Reduce a third of carbon footprint throughout the entire value chain	Carbon challenge (subsection 6.2.3).
Packaging and recycling	Reduced by 25% the amount of material used across the packaging.	Packaging light weighting collaboration initiatives (subsection 6.2.4).
	Ensure 40% recycled PET in the bottles.	Direct investment to increase supplier's capacity to provide rPET and engagement with stakeholders (subsection 6.2.4).
Sustainable sourcing	Sustainable source 100% of key agriculture.	Use of sustainability to evaluate suppliers and inclusion in contracts. (subsection 6.2.2).

The main materials supplied to "Beverage A" are ingredients (e.g. sugar and syrup), packaging (e.g. cans, glasses, cardboard) and gas (e.g. carbon dioxide) (Figure 6.1). The firm has more than 12,000 suppliers, most of them located in Europe (Corporate Responsibility and Sustainability Report 2014/2015). It is important to note that the syrup suppliers are part of the business system (product brand).

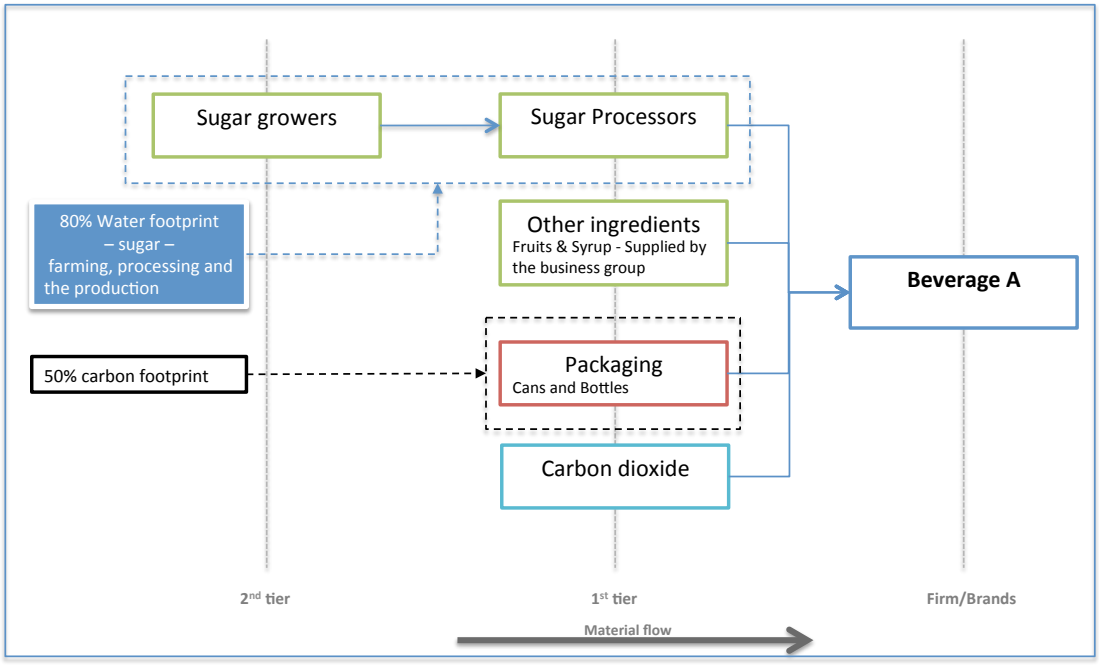


Fig. 6.1: "Beverage A"'s supplier base

Packaging and ingredients suppliers are critical. Packaging is carbon-intensive for “Beverage A”, representing 50% of carbon emission in the value chain (term used by the firm, which includes the supply chain – ingredients and packaging suppliers; the core business operations – manufacturing, distribution, refrigeration; consumers and recycling initiatives). Almost 350k tonnes of packaging materials was used in 2014 (e.g. PET – 33%, glass – 20%, aluminium – 15%, steel – 10%, and secondary and tertiary packs – 13%). Ingredients suppliers contribute for 18% of the carbon emission in the value chain. This includes sugar beet, sugar cane, coffee and fruits. Sugar is particularly critical for the business in terms of volume purchased and the water footprint (around 80% in the value chain). For instance, it was reported in one of the manufacturing sites visited that 40 tonnes of sugar were used daily.

The next section will examine the sustainability practices and organisational factors related to the supplier selection, performance assessment and development.

6.2.2 Sustainability diffusion through supplier selection

The supplier selection will be examined from design and implementation perspectives.

6.2.2.1 Design of sustainability requirements

“Beverage A” employs two requirements in the selection of new suppliers or renewal, namely: general sustainability requirements (GSR) and agriculture sustainability requirements (ASR). Both of them sets up the meaning of sustainable sourcing by providing the expectations and minimum requirements related to both environmental and social sustainability practices (Table 6.2). Compliance with the applicable regulation related to the human rights, responsible workplace (health and safety and labour) and environmental protection is focused in the GSR, which is addressed to general suppliers (e.g. packaging, materials, machineries, service providers). ASR is addressed to agricultural ingredients suppliers (growers) as part of the sustainable sourcing commitment. Overall, not only the compliance with the regulation is encompassed in the ASR but also more specific environmental sustainability practices, such as water management, soil management and climate protection.

The design of the GSR requirements considered the guidelines of the AIM-PROGRESS forum, which is a global initiative of leading fast moving consumer goods (FMCG) manufacturers and common suppliers to promote responsible sourcing practices. It includes common standards related to the human rights and labour standards, health and safety, environment and business integrity. According to the senior procurement manager, an internal cross-functional team and people from the business system (brand) were involved to define both requirements. Particularly in the design of the ASR, across-functional team was established to discuss the requirements and develop action to ensure suppliers’ compliance. A brand team, a NGO and some ingredients suppliers worked together in this process.

Based on the initial analysis of the organisational factors (OF) related to the design of the sustainability requirements (please see in the next subsection Table 6.3), the requirements (i.e. GSR – for general suppliers and ASR –

agriculture ingredients suppliers) cover both environmental and social practices (Table 6.2) and are aligned to the sustainability plan (sustainability policy and strategy – OF1). Interestingly, the 2020 sustainability plan established the key commitments, which were considered in the requirement's design. For instance, the sustainable sourcing commitment sets the target to source the key ingredients' suppliers responsibly. The requirements provide a clear meaning of sustainability by establishing the sustainability practices that suppliers need to consider (OF2). Senior managers supported the design of both requirements (OF3) (e.g. procurement, environmental and sustainability senior managers/directors). The internal cross-functional team was established to discuss the design and implementation of the requirements (OF4). Stakeholders were engaged (OF6) (NGO and brand team) and collaborative approaches were made to suppliers (ingredients growers and processors) (OF30) for designing the ASR. The use of industry code/guideline/principles/initiative (OF7) was influential to design the GRS requirements (AIM-PROGRESS Forum). The internal implementation of sustainability practices (OF8) (e.g. energy efficiency, employment and diversity and health and safety) was also identified. Both requirements provide a basis for measuring the supplier's compliance (e.g. human rights and environmental regulation) (OF9), which is covered in the supplier evaluation (next subsection).

Table 6.2 presents the sustainability practices included in the sustainability requirements and diffused through the supplier selection.

Table 6.2: Sustainability practices diffused through the supplier selection ("Beverage A").

Practices	**Sustainability requirements for**	
	General suppliers* (GSR) (1st tier suppliers)	**Ingredients suppliers (growers) (ASR) (2nd tier suppliers)**
Environment	- Compliance with environmental regulations [Practices or issues not mentioned]	- Compliance with environmental regulations - Water management - Energy management and climate protection - Conservation of natural habitats and ecosystems - Soil management - Crop protection - Harvest and postharvest handling - Reproductive material identity, selection and handling - Management system - Business integrity
Social[1] [1] Common for GSR and ASR	*Human rights* - Child, forced labour, abuse of labour - Eliminate discrimination - Freedom of association and collective bargaining *Working conditions* - Employee health ad safety - Wages and benefits[2] - Working hours and overtime[2] [2] in accordance with local regulation.	

* Materials and services – e.g. packs, gas providers, machineries suppliers, processors, service providers.

6.2.2.2 Implementation of sustainability requirements

Lead by the procurement division, "Beverage A" formally communicates the requirements and adopts a scorecard to evaluate suppliers, which includes as

core measures the total cost of ownership, quality of goods and services, delivery, communication, continuous investment in innovation and growth and sustainability. These six dimensions of evaluation are equally considered in the final score. Suppliers are responsible for answering a questionnaire (self-evaluation) including sustainability dimension, which is in line with the GSR. Third party audits are conducted covering the dimensions of scorecards (OF6). The GSR is also included in all new contracts or incorporated during the renewal. For instance, 68% of spending with suppliers in 2014, approximately 8,700 suppliers, were enclosed by contracts that considered the GSR. The senior quality, environmental, safety and health (QESH) manager believes that the scorecard and the contractual agreement are key factors to drive sustainability across the supply chain.

ASR provides sustainability practices for the sugar growers and was designed through collaborative approaches with the sugar processors. However, the processors make the selection of the sugar growers. On the other hand, "Beverage A" was also engaged by the Sustainability Agriculture Initiative (SAI) platform[5], in conjunction with other major FMCG manufacturers (including competitors) and European sugar beet processors to develop a farm-level self-assessment tool called the farm sustainability assessment (FSA). In this way, SAI, manufacturers and processors work together to disseminate sustainability practices at the growers' level. FSA comprises the three dimensions of sustainability, covering environmental aspects (e.g. agro-chemical, air, biodiversity, crop protection, farm management, planting, soil management, waste management and water management), social aspects (e.g. health and safety, labour condition and local community) and economic aspects (e.g. financial stability, market access and legal compliance). FSA encompasses the AGP requirements and addresses what sustainability practices are expected of sugar beet suppliers. This allows growers to evaluate their sustainable agriculture practices and communicate consistently to customers:

> *"I think we are able to define what sustainable sugar is and how we are going to measure it, how they [suppliers] are going to show compliance to the different code of conduct or principles. This is going well and I think it is a win-win model for everyone".* [Senior procurement manager].

A similar strategy was adopted for sugar cane suppliers. This included other two non-profit organisations, Bonsucro and Rainforest Alliance. Bonsucro focuses on sustainability measurement of the sugarcane sector by leading a certification scheme, covering land rights (land ownership and respect to local communities), enterprise resilience (yields), labour rights (safety, ILO standards – e.g. wages, human rights), climate changes (GHG emissions) and natural resources (water and biodiversity). With the Rainforest Alliance[6], "Beverage A" has focused on developing an understanding of the sustainability risks and current best practices in the sugarcane supply chain in Europe. The Rainforest Alliance has also audited some farmers.

[5] SAI is a non-profit organisation made up of more than 80 food companies and retailers with aim at facilitating sharing knowledge and best practices to support the development and implementation of sustainable agriculture practices.

[6] Rainforest alliance is a NGO, which works to conserve biodiversity and ensure sustainable livelihoods by transforming land-use practices, business practices and consumer behaviour.

Interestingly, these two crops (beet and cane) have different sustainability issues, especially intensified by the geographic location. According to the senior procurement manager most of sugar comes from beet farmers in Europe (95%) and the rest comes from sugar cane produced in subtropical areas, most of them in developing countries. In Europe, even the expectation for environmental and social practices is the same; more attention is given to working with environmental practices, such as the use of pesticides and water management. Outside Europe, especially in developing countries, there is equal focus on both environmental and social (e.g. human and labour) practices. In these countries the regulation is influential for the sustainability maturity level of suppliers:

> *"[…] maturity level of our suppliers are going to be different from the country to another, but at the end the expectation is exactly the same. Essentially, due to the low regulation already in place in the country, suppliers are going to comply with these regulations. It is not an obligation they sometime do not implement. This sometimes drives the maturity of our suppliers".* [Senior procurement manager].

In order to implement sustainability requirements the procurement team were given training on the "Beverage A"'s sustainability journey and commitments (e.g. the sustainability plan), sustainability issues related to specific commodities, expectations on suppliers and mainly how to use the supplier scorecard. The sustainability division coordinated this initiative to provide the procurement team with the skills required to understand the sustainability plan and to drive sustainability across the supply chain:

> *"[…] training our procurement professionals to understand our sustainability agenda has been absolutely critical. So, they have a very clear understanding what we expect of our suppliers in terms of sustainability issues [...] when they are involved in discussion directly with our suppliers they are able to have a meaningful conversation"* [Sustainability director].

Table 6.3 (p. 82) provides the organisational factors related to the implementation of the sustainability requirements. "Beverage A" clearly communicates the sustainability requirements (OF10) using guidelines and enforces compliance with them by using contracts (OF15). Supplier evaluation (self-evaluation and audits – mechanism used for supplier's evaluation against the selected requirements – OF11) is based on a scorecard, which covers six dimensions (cost, quality, delivery, communication, investments and sustainability). These dimensions are equally considered in the scorecard, persuading suppliers to consider the GRS and therefore implement sustainability practices. The equal importance of sustainability in the evaluation (OF37) is uncovered as a new organisational factor affecting the diffusion of both environmental and social practices.

The support of the senior managers (OF3) and cross-functional integration (OF4) (i.e. procurement and sustainability team) were also identified in the development of the internal capability (OF12) (i.e. developing knowledge/skills needed by the procurement team to address sustainability across the suppliers) (Training purchasing staff on sustainability issues - OF23). This training specifically focused on supporting the dialogue with suppliers to communicate requirements, the suppliers' evaluation and to carry out the supplier relationship management programme (next subsection). The final decision to select a supplier is made by the procurement managers and the training influences this

process. This factor was previously identified in the literature on the performance assessment, but was not influential in the selection. The engagement of external stakeholders to disseminate sustainability practices toward the first tier through the development of the farm sustainability assessment (FSA) tool in partnership with SAI platform and FMCG manufactures and processors was also identified.

With regard to the scope of implementation of the sustainability requirements (OF13), the GSR is communicated and formalised in contracts and suppliers who are at the first tier (e.g. packaging, ingredients and machineries) are evaluated against it. A different strategy for growers (2nd tier) was identified. "Beverage A" communicates the ASR to sugar processors, which in turn ensure the growers' compliance. FSA tool is also used to support this process.

Table 6.3: Organisational factors for sustainability diffusion through the supplier selection ("Beverage A").

SCM		Organisational factors	Sustainability Practices	
			Environ.	Social
Supplier selection – sustainability requirements	Design	Buying firm's sustainability policy and strategy (OF1)	X	X
		Providing a clear meaning of sustainability (OF2)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	X
		Products and/or components characteristics/risk (OF5)	NI[1]	NI[1]
		Engagement of external stakeholders (OF6)	X	X
		Use of industry code/guideline/principles/initiatives (OF7)	X	X
		Internal implementation of sustainability practices (OF8)	X	X
		Basis for measuring supplier compliance (OF9)	X	X
		Collaborative approaches with suppliers (OF30)	***PI[1]***	***PI[1]***
	Implementation	Clear communication of sustainability requirements (OF10)	X	X
		Supplier's evaluation (OF11)	X	X
		Internal capabilities (OF12)	X	X
		Scope for implementation of sustainability requirements (OF13)	X	X
		Volume of business with suppliers (OF14)	NI[2]	NI[2]
		Use of contract (OF15)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	X
		Engagement of external stakeholders (OF6)	X	X
		Training purchasing staff on sustainability issues (OF23)	***PI[2]***	***PI[2]***
		The equal importance of sustainability in the evaluation (OF37)	***NFI***	***NFI***

[Environ.] Environment

X – Factors identified through empirical evidences

NI – Not identified

NI[1] – It was not found as being influential in the design of the requirements.

NI[2] – All potential suppliers regardless of the volume of business are evaluated against sustainability requirements before becoming a business partners.

PI – Previously identified

PI[1] – Joint design of GSR (agriculture sustainability practices) with ingredients processors and growers. A NGO and a brand team were also engaged (OF6).

PI[2] – Training to develop the procurement skills to address sustainability in the selection and the relationship programme. These previously identified in the literature but not related to the design and implementation of the sustainability requirements.

NFI – New factor identified

Sustainability has equal importance in the supplier's evaluation (scorecard).

6.2.3 Sustainability diffusion through supplier performance assessment

6.2.3.1 Design of supplier sustainability performance assessment

The supplier sustainability performance assessment is part of the "Beverage A"'s supplier relationship programme, which aims to encourage suppliers to improve their own performance. Two mechanisms are used in the performance assessment, an independent platform held by Ecovadis scorecards and a supplier carbon programme (questionnaire), called "carbon challenge". These two mechanisms annually assess the performance of key suppliers, which are covered based on the spending and the carbon risk. 140 key suppliers are currently engaged in performance assessment, representing more than 80% of the spending and 99% of the total carbon emissions in the supply chain. These suppliers are located in the first tier, including gas suppliers, packs suppliers, service providers, and ingredients processors.

The Ecovadis platform is an independent firm that assesses suppliers against 21 criteria divided into four areas: environment, social, ethics and sustainable procurement (Appendix E). According to the procurement manager this platform was selected because it covers the general sustainability requirements (GSR) and has been implemented worldwide by companies in different sectors. Key suppliers are rated on their capacity to demonstrate the implementation of sustainability practices by answering the industry sector specific questionnaire and providing supporting documents to the platform. Ecovadis also provides potential performance areas that can be improved. Based on the information, an action plan can be developed in order to help suppliers increase their rating.

The carbon challenge in turn aims at reducing the supplier carbon footprint. Key suppliers are engaged to measure their carbon emission through CO_2 equivalent, including direct, such as fuel usage and indirect (e.g. purchased electricity) sources of emission, as well as take action to reduce the emissions. This initiative was launched in 2011 and based on the results, suppliers were sorted into low (e.g. buildings, professional services), medium (e.g. Sugar and logistics) and high (e.g. Packaging suppliers – PET, glass, can ad plastics) impact risk. Interestingly, "Beverage A" has annually measured its carbon footprint in accordance with the WRI/WBCSD protocol[7]. This experience was influential for the design of measures for the carbon challenge. Furthermore, integration between the internal environmental specialists, the procurement team and supplier representatives was carried out to understand better the carbon footprint challenges and, especially to develop the measures.

Supplier performance assessment focuses on compliance with the selected requirements by using a third party sustainability database (Ecovadis) and reducing the suppliers' carbon footprint (Carbon challenge) (Definition of supplier performance assessment purpose - OF16). Interestingly, Ecovadis is a third party sustainability database adopted to evaluate key suppliers' compliance (OF6 – engagement of external stakeholders) and covered the sustainability practices listed in the GSR requirements (sustainability requirements - OF19). Key suppliers are covered in the performance

[7] WRI/WBCSD green house gas protocol was designed by the World Resource Institute in collaboration with World Business Council for Sustainable Development and provides guidelines for firms to measure, prepare and disclosure GHG emissions inventory.

assessment and are selected based on spending and carbon risk (Definition of suppliers to be assessed - OF17) (please see in the next subsection Table 6.4). In general, the design of the performance measures (carbon challenge programme) took into consideration the key sustainability challenges (e.g. carbon footprint and climate change) established in the sustainability plan (OF1). Moreover, the use of international standards and industry guideline (OF7) (i.e. WRI/WBCSD protocol), the support of the senior procurement managers (OF3), cross-functional integration (OF4) (i.e. procurement team and environmental specialists) and collaborative approaches with suppliers (OF30) to jointly discuss and design the carbon measures were critical in defining effective and consistent measures (OF18) for the carbon challenge. Interestingly, collaborative approaches with suppliers (OF30) were previously identified in another category based on the literature but not associated with the design of performance measures (i.e. carbon challenge).

6.2.3.1 Performance assessment implementation

The use of Ecovadis allows "Beverage A" to monitor the suppliers' sustainability performance and in general the compliance with the selected requirements. Suppliers are responsible for paying the fees to be assessed on an annual basis. Where there is a low score, suppliers are responsible for defining and implementing a corrective action plan. Essentially, "Beverage A" monitors the supplier progress through the platform and checks suppliers' resources and top manager support:

> *"We ask the suppliers to build all action plan, because we think it needs to be accountable about providing answers to weakness. They know the company more than anyone. What we do is to support them delivering the plan, making sure that they have resources and the support of the top management to invest some time in this exercise"* [Senior procurement manager].

According to the senior procurement manager, low score suppliers in the Ecovadis platform could lose business if they do not improve their score in the final performance assessment. This might justify the fact that since 2012, when the Ecovadis was introduced, the average scores of the suppliers have increased, showing progress in the four areas (Sustainability Report 2014/2015). Third part firms against the general sustainability requirements also audit those key suppliers based on the Beverage A"'s sustainability audit protocol.

In terms of the carbon challenge, "Beverage A" addresses different efforts made by the key suppliers according to the segmentation of carbon impact (Figure 6.2, p. 85). For instance, suppliers sorted as low impact need to measure their carbon emissions. Medium impact suppliers need to measure and also to develop carbon reduction plans, including baselines and targets, which are monitored to assess progression. In the last category, high impact suppliers also need to share the carbon information and best practices implemented to reduce carbon emissions. This programme allows "Beverage A" to engage with its key suppliers on a one-to-one basis to implement sustainability practices, in particular those related to carbon management.

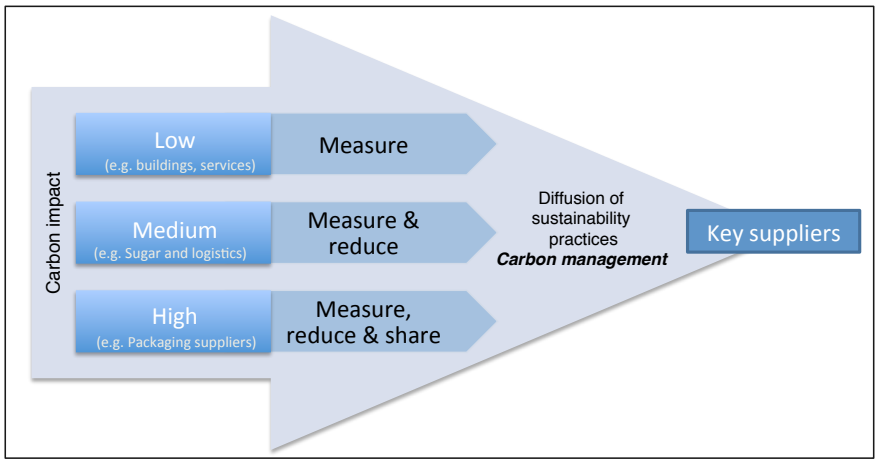


Fig. 6.2: "Beverage A"s effort for sustainability diffusion through supplier sustainability performance assessment.

Table 6.4 (p. 86) points out the empirical observations concerning the organisational factors related to the design and implementation of the supplier performance assessment. Overall, the procurement team, previously trained by the sustainability team (OF23) to ensure they had the knowledge and skills needed to run the performance assessment, is responsible for managing the information from the measurement mechanisms, monitoring and feeding back suppliers. Moreover, enhanced communication (OF25) is critical for gathering data for both mechanisms (Ecovadis and Carbon challenge). Suppliers are aware of the consequences of the score in the assessment (OF24). They need to implement sustainability practices to improve the performance where scores are low; otherwise they can lose a volume of business. The procurement team supports suppliers in the assessment (OF29) and seeks to check suppliers' resources (OF27) and support suppliers' top managers (OF28) to implement the practices. For the reduction of carbon emissions, it is evidenced that collaborative approaches with suppliers (OF30) is key for engaging them to implement carbon management practices and achieve the targets. Concerning the organisational factors related to the performance assessment implementation, table 6.4 summarises the empirical observations.

Table 6.4: Organisational factors for sustainability diffusion through the supplier performance assessment ("Beverage A").

SCM		Organisational factors	Sustainability Practices	
			Environ.	Social
Supplier performance assessment	Design	Definition of performance assessment purpose (OF16)	X	X
		Definition of suppliers to be assessed (OF17)	X	X
		Definition of consistent performance measures (OF18)	X	X
		Sustainability requirements (OF19)	X	X
		Measurement systems implemented (OF20)	X	NI[1]
		Management systems implemented (OF21)	NI[2]	NI[2]
		Buying firm's sustainability policy and strategy (OF1)	X	X
		Support of top and middle managers (OF3)	X	NI[3]
		Cross-functional integration (OF4)	X	NI[3]
		Engagement of external stakeholders (OF6)	NI[2]	NI[2]
		Use of industry code/guideline/principles/initiatives (OF7)	X	NI[1]
		Collaborative approaches with suppliers (OF30)	***PI***	NI[3]
	Implementation	Performance mechanisms (OF22)	X	X
		Training purchasing staff on sustainability (OF23)	X	X
		Understanding of benefits and risk of sharing information (OF24)	X	X
		Enhanced communication with suppliers (OF25)	X	X
		Strengthened relationship (OF26)	X	X
		Understanding suppliers' capability (OF27)	X	X
		Support of suppliers' top managers (OF28)	X	X
		Supporting and assisting suppliers in the assessment (OF29)	X	X
		Collaborative approaches with suppliers (OF30)	X	X
		Feeding back supplier performance assessment (OF31)	X	X
		Cross-functional integration (OF3)	NI[4]	NI[4]
		Support of top and middle managers (OF4)	X	X
		Engagement of external stakeholders (OF6)	X	X
		Internal capabilities (OF11)	X	X

[Environ.] Environment

X – Factors identified through empirical evidences

NI – Not identified

NI[1] – The carbon footprint implemented was influential for designing the carbon measures in the carbon challenge programme. WRI/WBCSD standards were also considered in the definition of the carbon measures;

NI[2] – OF6 & 20 - no evidence was found linking these factors with the design of the performance purpose and measures.

NI[3] – OF3, 4 & 30 were influential only for the design of the carbon challenge measures (environmental practice).

NI[4] – The procurement team carries out the supplier performance assessment. No evidence was found related to the integration with other functions to run the programme.

PI – Previously identified

A collaborative approach with key suppliers was taken place to define the carbon challenge measures.

6.2.4 Sustainability diffusion through supplier development

6.2.4.1 Design of supplier sustainability development

As part of the supplier relationship management the supplier development initiatives focus on motivating the key industrial suppliers to improve their sustainability performance and disseminating the best sustainability practices implemented by them. This addresses specific commitments of the sustainability plan and the outcomes of the supplier performance assessment. The sustainability commitments "packaging and recycling" and "energy efficiency and climate change", which mainly focus on carbon footprint reduction, are considered.

Table 6.5 presents the sustainability practices diffused and the development initiatives, as well as the suppliers engaged and some organisational factors, which were influential in the design of the development initiative. For instance, “Beverage A” through a joint venture invested massively to increase the rPET resin supplier’s capacity to provide the material. The award is founded on the supplier sustainability performance assessment and top-performing suppliers (i.e. best score in Ecovadis and Carbon challenge) are recognised in the annual meeting with key suppliers. The best practices implemented by suppliers to improve the score in the Ecovadis and to measure and reduce carbon footprint are presented during an annual webinar.

Table 6.5: Design of supplier sustainability development initiatives (“Beverage A”).

Suppliers (OF34)	**Sustainability practices diffused / Purpose (OF32)**	**Initiative (OF33)**	**Supplier sustainability performance assessment (OF35)**	**Other factors evidenced as influential in the design of the initiative**
Packaging suppliers	Reducing packaging - Redesign of packaging	Joint plan for packaging redesign – Collaborative approach with suppliers to study the feasibility of the purpose.	LCA supports the analysis of new packaging projects presented by suppliers	OF1, OF3, OF4*, OF5 and OF30 * commercialisation team, procurement, technical experts in packaging.
Packaging suppliers – rPET resin supplier	Increasing the use of rPET resin	Investment – Joint venture & joint plan - Increase the rPET suppliers’ capacity. - Collaborative approach with the rPET suppliers to collecting and processing used bottlers.	The outcomes of the assessment is used for technical assistance	OF1, OF3, OF4*, OF17 and OF30 *procurement, sustainability division, environmental team.
Packaging suppliers – glass bottle supplier	Heat exchange to decrease carbon emissions	Joint plan for reducing carbon footprint - Collaborative approach with suppliers to study the feasibility of the purpose.	Not evidenced	OF1, OF5, OF3, OF4* and OF30. * procurement, engineering, environmental specialist.
Industrial suppliers	Improving performance in the carbon challenge	Transferring knowledge (educating – annual training)	Best practices implemented to supplier to improve the carbon performance are mapped and shared in the educating initiative.	OF1 and OF3
		Award	Top-performing suppliers are recognised. Survey is carried out with key suppliers.	OF1 and OF3

Therefore, the design of the supplier sustainability development initiatives (e.g. joint plan for packs design, investment, joint plan for sustainability objective, award, survey and webinar) has been clearly focused on meeting the sustainability plan, especially the commitments, which impact on the reduction

of carbon footprint (OF1) (please see in the next subsection Table 6.6). Key suppliers, which are located in the first tier (e.g. packs suppliers and ingredients processors), are directly engaged. In the next section, the implementation of the development initiatives identified for supplier sustainability development will be discussed.

6.2.4.2 Supplier sustainability development implementation

The commitment to "sustainable packaging and recycling" addresses two development initiatives namely: redesign of packaging and the use of rPET. The first one focuses on reducing packaging (e.g. PET and glass bottles and aluminium cans). "Beverage A" achieved a reduction of 1,266 metrics tons of material in 2014, 9,300 tons CO_2 equivalent. For that a joint plan for packaging development with suppliers has been implemented. This demands technical tasks and cross-functional integration, involving technical experts in packaging, commercialisation team and procurement team (OF4). Collaborative approaches with key suppliers (OF30) and a strengthened relationship with them (e.g. trust and long term relationship) (OF26) were also influential:

> *"This happens overtime, and is something that depends on long-term supplier relationship and trust […] we have a commercialisation that work with our suppliers when we introduce new packs side, new pack format, recycled content [...] so we work very closely [...] this will not be something that we just demand to suppliers to do something".* [Sustainability director].

Regarding the rPET initiative, "Beverage A" has invested into suppliers through long-term joint venture. In the UK, a new facility responsible for the recycling process was built with an investment of more than $10 million. This facility doubled the amount of rPET made in the UK and solved one barrier for the use of rPET that was the availability of recycled material on the market. The supplier involved in this initiative is therefore critical considering the resource dependency. According to the sustainability director, this is a successful partnership, "based on trust, very clear shared interest and focus on common aims and objectives". "Beverage A" has also engaged retailers, consumers, local government (waste management agency) and the rPET suppliers in a circular economy model in order to increase the amount of the used packaging to be collected and reprocessed. This included consumers' awareness campaign, establishment of returning points in partnership with retailers and local communities and reverse logistics transportation to the recycling facilities (rPET suppliers). In this sense, engagement with different stakeholders (OF6) and collaborative approaches with suppliers (OF30) were critical for implementation of this initiative. In 2014, "Beverage A" reprocessed 88% of the total packaging reprocessed compared with total used (12% more than 2012 when this indicator started being measured). Another interesting factor is regarding the risk management for the implementation of this initiative. The risk is "managed by doing joint venture and agreements monitored by the contract" (Senior procurement manager). Therefore, the risk management (OF39) has been a critical factor in this initiative. This is a new factor related to supplier development implementation found in this case, which enhances the diffusion of sustainability practices.

"Beverage A"'s manufacturing sites have the autonomy to directly engage their suppliers in sustainability. In one of the sites there is a heat exchange pilot

programme in partnership with a glass bottle supplier, which is located very close to the manufacturing facility. Residual heat from the supplier is captured and used in a heat-driven process in “Beverage A”’s facility, providing 30% of the energy demanded and saving 3,000 tonnes of carbon per year. This initiative required support of senior managers of the firm (OF3), as well as “Beverage A”’s cross-functional team (e.g. engineering and environmental and energy specialists) (OF4) and a strengthened relationship (e.g. trust) with the supplier (OF26). Moreover, the organisational factors understanding suppliers’ capability (OF27) and support of suppliers’ top managers (OF28) were critical in this initiative according to the sustainability director.

The initiatives based on the supplier relationship programme are made up of awards and webinars. The most common sustainability practices that have been implemented by the winners in the award are related to building a sustainability strategy in line with the “Beverage A”’s sustainability plan and allocation of resources devoted to deploying environmental and social sustainability projects. The implementation of the best low-carbon practices (e.g. energy efficient technologies, ISO 14064 accreditation and establishment of carbon reduction targets) was also evidenced.

“Beverage A” also promotes a survey every two years among the key suppliers. The previous ones looked for understanding the main drivers for sustainability and enablers for sustainability innovation. The first survey revealed that the main drivers for sustainability were long-term business viability, energy cost savings and customer expectations. Furthermore, internal capability, such as resource and technologies were critical to driving sustainability progress in their organisations. In the last survey, supplier collaboration, customer collaboration and employee contribution were the best success factors to enabling sustainability innovation. This allows “Beverage A” to understand some challenges to collaboration with suppliers in sustainability. The survey outcomes are also presented during the annual webinar. Moreover, the webinars are also adopted to communicate the expectations regarding sustainability and encourage continuous dialogue with the key suppliers. According to the senior procurement manager this initiative has an impact on helping suppliers to improve their sustainability performance, especially the carbon management maturity. Best practices about measuring and reducing carbon footprints are also discussed during the webinars.

Overall, the impact assessment of the development initiatives (OF36) is done by measuring the progress of the sustainability commitments, which have specific measures, such as the amount of carbon saved annually by light weighting packs, the amount of packaging reduced and the perceptual of use of rPET.

Based on the initiative which focused on the use of rPET, a new factor was empirically uncovered and a factor previously identified in another SCM activity was identified. The firm studied the different stakeholders engaged (i.e. consumers, retailers, government and rPET supplier) (OF6) in an attempt to guarantee a continuous volume and reverse flow of used bottles to be recycled thereby increasing the stakeholders’ awareness of recycling. Table 6.6 (p. 90) presents the organisational factors identified which influence the design and implementation of supplier sustainability development.

Table 6.6: Organisational factors for sustainability diffusion through the supplier development ("Beverage A").

SCM		Diffusion factors	Sustainability Practices	
			Environ.	Social
Supplier development	Design	Definition of supplier development purpose (OF32)	X	X
		Definition of development Initiative (OF33)	X	X
		Definition of suppliers to be engaged (OF34)	X	X
		Supplier sustainability performance assessment (OF35)	X	X
		Buying firm's sustainability policy and strategy (OF1)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	NI[1]
		Products and/or components characteristics/risk (OF5)	X	NI[2]
		Internal implementation of sustainability practices (OF8)	NI[3]	NI[3]
		Sustainability requirements (OF19)	X	X
		Collaborative approaches with suppliers (OF30)	X	NI[1]
	Implementation	Assessment of the impact of the supplier development initiative (OF36)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	NI[1]
		Internal capabilities (OF11)	X	X
		Training purchasing staff on sustainability issues (OF23)	X	X
		Enhanced communication (OF25)	X	X
		Strengthened relationship (OF26)	X	NI[1]
		Understanding suppliers' capability (OF27)	X	NI[1]
		Support of suppliers' top managers (OF28)	X	NI[1]
		Collaborative approaches with suppliers (OF30)	X	X
		Engagement of external stakeholders (OF6)	***PI***	NI[1]
		Risk management (OF39)	NFI	NI[1]

[Environ.] Environment

X – Factors identified through empirical evidences

NI – Not identified

NI[1] – Not identified for diffusion of social practices, only for reducing carbon footprint initiatives.

NI[2] – Carbon footprint is influential for the initiatives to reducing packaging (environmental sustainability).

NI[3] – No evidence was found linking OF7 with the design of the development initiatives.

PI – Previously identified

Consumers, retailers and government were engaged to return of the used bottlers for recycling.

NFI – New factor identified

The risk of the joint venture to increase the supplier's capacity to make rPET is managed by monitoring the agreements of the contract.

6.3 CASE STUDY 2 – "Beverage B"

6.3.1 Brief company description

The second case study was carried out within a firm specialising in making coffee products and espresso coffee machines. The firm, called "Beverage B" here, is based in Italy, where the coffee roast process, packaging and warehousing occur. The firm exports its products to 140 countries and is recognised worldwide by its sustainability initiatives. "Beverage B" was rewarded by the Ethisphere[8] as the world's most ethical company in the coffee sector. "Beverage B" adheres to the United Nations' global compact and ILO principles, focusing on implementing and diffusing sustainability practices

[8] Global initiative for defining and measuring corporate ethical standards and companies and promoting best practices in corporate ethics.

related to human rights, labour standards, environment and anti-corruption. The firm is also certified by EMAS and ISO 14001 and has employed energy efficiency programmes.

The firm has implemented two independent certification schemes to drive sustainability across its stakeholders and green coffee suppliers. The first one comprises the identification and engagement of stakeholders, identification of material issues and risks, development of social responsibility initiatives and communication. This seeks to ensure that “Beverage B” employs consistent approaches to manage ethics, social, environmental and employment risks. The green coffee supply chain certification is one of the core strategies addressing sustainability practices across the green coffee supplier base. This scheme focuses on the firm’s capability related to selecting and engaging the coffee growers and transferring knowledge. More details will be presented in the next sections.

“Beverage B” uses more than 300,000 sacks of green coffee per year, which represents more than 60% of total weight of material purchased. Green coffee is the terminology used to describe the unroasted coffee bean, which was harvested and passed through the cleaning process, including pulping, removal of mucilage, washing and drying stages. The green coffee is exported from America (Brazil, Colombia, Costa Rica, El Salvador and Nicaragua), Africa (Ethiopia and Tanzania) and Asia (India and China). The firm is committed to buying directly from the producers. In Brazil, the growers (around 450 units) usually send the green coffee directly to the exporter. However, in some locations, more actors are involved in the green coffee supply chain, increasing the complexity in terms of traceability. For instance, in India, the exporters usually receive the coffee cherry from a huge number of small growers and use a private specialised warehouse to carry out the cleaning process. In Colombia the exporters usually buy from growers’ cooperatives which are also responsible for the cleaning process. Thousands of growers located close to the cooperatives provide the coffee cherry.

In order to try to represent these configurations, Figure 6.3 (p. 92) illustrates the green coffee supply chain, considering that the growers are in the first tier and the exporters in the second one. The processors can be in the second tiers when the cleaning process occurs in the farms or in the first tier through cooperatives or specialised warehouses. The industrial suppliers are responsible for providing primary and secondary packaging (e.g. metals, cardboard, plastic, capsules, jute sacks), inert gas (carbon dioxide and nitrogen), chemicals (e.g. Inks and solvents), equipment and machineries, and coffee machines and accessories. They represent more than 30% of the materials provided regarding the total of weight. The vast majority of industrial suppliers in terms of purchase spending consist of primary and secondary packaging manufacturers (most of them located in Italy, 100% in Europe), followed by coffee machine manufacturers (most of them in China).

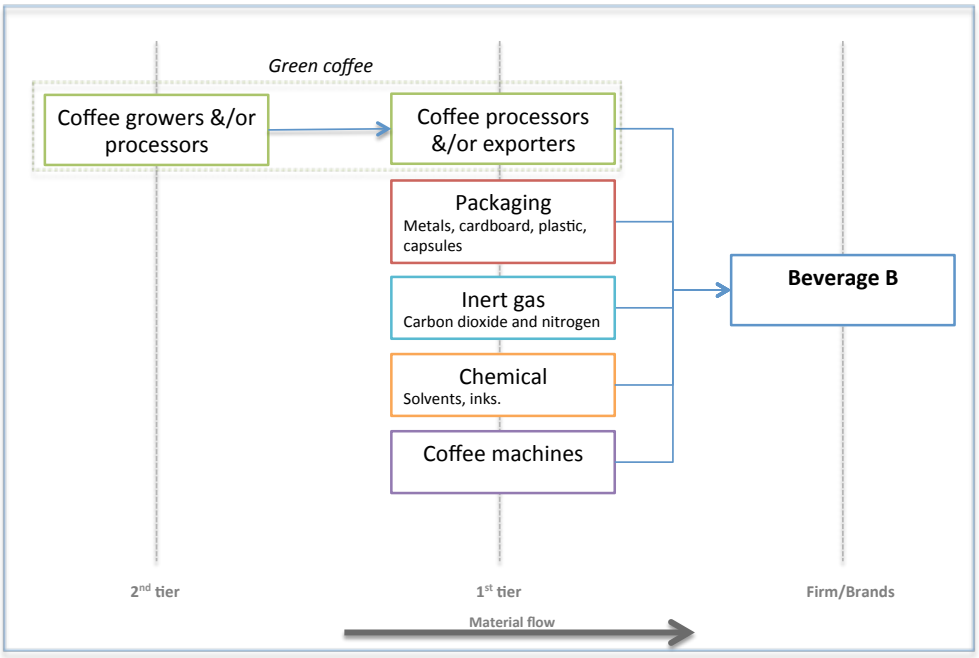


Fig. 6.3: "Beverage B"'s supplier base.

6.3.2 Sustainability diffusion through supplier selection

6.3.2.1 Design of sustainability requirements

In contrast to case 1 where all material suppliers, including sugar (core ingredient), were selected and managed by the same procurement team, in this case there was a specific department for coffee suppliers, called a coffee procurement department and another department for the industrial suppliers (procurement department). These departments generally seek to create a stable supplier base through long-term collaborative approaches, shared objectives, reciprocal growth and diffusion of sustainability practices

A specific document for the sustainability requirement was not evidenced. "Beverage B"'s communicates its code of ethics to suppliers providing some principles related to the relationship, including transparency and clarity. The code of ethics also states that the relationship is subject of monitoring controls and contracts. Its code outlines the firm's commitments and values to its stakeholders and defines the rules and guidelines on how its employees might comply with the code. For instance, with respect to the suppliers, "Beverage B"'s employees might consider transparency, non-bribery, monitoring and compliance with regulation. Interestingly, ethics is defined as a long-term value built through sustainability, transparency and people development.

It is important to note that the code of ethics does not provide by itself specific sustainability practices and an expected behaviour that suppliers need to meet. On the other hand, "Beverage B" uses contracts to emphasise compliance with the environmental and labour regulations, human rights (non-discrimination, non-abuse or harassment, forced labour and child labour) and payment with minimum wages. This is the expected behaviour in the supplier base, providing a basis for measuring suppliers' compliance (OF9). These sustainability practices were mostly defined based on ILO standards and global

compact principles. Consequently, even though the design of sustainability requirements was not evidenced, the organisational factors OF1 (Firm's sustainability policy and strategy) (Code of ethics and the green coffee certification) and OF7 (use of industry code/guideline/principles/initiatives) (e.g. Global compact and ILO) were evidenced as being influential in the definition of the sustainability practices considered in the contracts. The organisational factors support of top managers (OF3), cross-functional integration (OF4) (i.e. Procurement, Quality and Legal department), internal implementation of sustainability practices (OF8) (i.e. social responsibility practices, e.g. human rights, labour standards and anti-corruption). The next section will focus on the implementation of these sustainability practices, which is based on the supplier evaluation and use of contracts.

6.3.2.2 Implementation of sustainability requirements

In the case of either renewal or the inclusion of new coffee exporters, a rigorous quality control is carried out for green coffee and roasted coffee in Italy. The actors, including exporters, processors and growers, are then mapped and evaluated in terms of their sustainability. When there are a huge number of growers, the evaluation is based on a sample of growers. "Beverage B" also seeks to understand the relationship between actors. This also allows the firm to integrate the supply chain, ensuring quality, quantity and traceability, as well as managing the sustainability risk. Moreover, "Beverage B" ensures it pays a fair price to the growers by evaluating the production cost. Based on that, the production cost according to different regions and typology of growers is map in order to avoid paying a price below the production cost. The payment is actually based on this production cost, a fair profit margin and the stock market standard. According to the green coffee senior manager this allows the growers to invest in the farm and increase their quality and sustainability.

The coffee procurement department conducts the sustainability evaluation through 2nd party audits (OF11). For that, "Beverage B" developed its audit capacity to cover different regions and contexts by training its coffee technicians (OF23). The technicians are responsible for carrying out the evaluation; monitoring and assisting the suppliers in developing and implementing an action plan for improving performance or treating non-compliances. The sustainability criteria used in the supplier evaluation (selection) is the same used in the supplier sustainability performance programme, which covers both environmental and social practices.

"Beverage B" has also implemented a procurement procedure to review the contracts and to evaluate its industrial suppliers. The contracts are usually renewed every year in terms of quotation and price in order to optimise the total cost and productivity. An online platform has been used to manage the contract with suppliers and share information. According to the procurement director, "most of our suppliers have worked with us for years and there was no step back to evaluating them before the selection and What we have been done is to monitor their performance through a balance scorecard". This includes price, productivity, turnover investment, logistics, quality, know-how from technological perspective, security and non-conformity related to delivery. However, sustainability is not integrated in this evaluation. Actually, suppliers are evaluated through a self-evaluation questionnaire which includes only

environmental dimension. This is run by the environmental manager, who is based on the quality department (OF4). When "Beverage B" selects a new industrial supplier, the environmental authorisation from the local agency and ISO 14001 are checked in the qualification phase. However, they are not mandatory. Then the balance scorecard and the environmental questionnaire are employed to evaluate suppliers in the qualification phase. Finally, a third party audit is carried out, evaluating the labour and human rights conditions, as well as the environmental management initiatives at the supplier's facility (OF6).

Table 6.7 presents the organisational factors empirically identified in the supplier selection. It was apparent that the contract (OF15) states both environmental and social sustainability practices that suppliers need to meet, providing the basis for measuring compliance (OF9). The sustainability practices considered in the contracts were selected based on the ILO and global compact principles (OF7).

Table 6.7: Organisational factors for sustainability diffusion through the supplier selection ("Beverage B").

SCM		Organisational factors	Sustainability Practices	
			Environ.	Social
Supplier selection – sustainability requirements	Design	Buying firm's sustainability policy and strategy (OF1)	X	X
		Providing a clear meaning of sustainability (OF2)	*NI*[1]	*NI*[1]
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	X
		Products and/or components characteristics/risk (OF5)	*NI*[1]	*NI*[1]
		Engagement of external stakeholders (OF6)	*NI*[1]	*NI*[1]
		Use of industry code/guideline/principles/initiatives (OF7)	*NI*[2]	X
		Internal implementation of sustainability practices (OF8)	*NI*[2]	X
		Basis for measuring supplier compliance (OF9) (sustainability practices and expected behaviour established in contracts)	X	X
	Implementation	Clear communication of sustainability requirements (OF10)	X	X
		Supplier's evaluation (OF11)	X	X
		Internal capabilities (OF12)	X	X
		Scope for implementation of sustainability requirements (OF13)	X	X
		Volume of business with suppliers (OF14)	*NI*[3]	*NI*[3]
		Use of contract (OF15)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	*NI*[4]
		Engagement of external stakeholders (OF6)	X[b]	X[b]
		Training purchasing staff on sustainability issues (OF23)	***PI***[2]	***PI***[2]
		The equal importance of sustainability in the evaluation (OF37)	***NFI***	***NFI***

[Environ.] Environment

X – Factors identified through empirical evidences (both for green coffee and industrial suppliers)

X[b] – Evidenced only for the industrial suppliers

ni – Not identified

NI[1] – OF2, OF5 & OF6 were not identified as being influential in the definition of sustainability practices.

NI[2] – OF7 & OF8 were evidenced just for social sustainability practices, e.g. human rights.

NI[3] – All new suppliers regardless of the volume of business are evaluated before becoming a business partners.

NI[4] – Cross-functional integration was evidenced in the renewal of contracts of industrial suppliers, when the self-environmental evaluation is employed by the environmental manager to evaluate the industrial suppliers.

PI – Previously identified

PI[1] – The coffee technicians were trained to run the evaluation and performance assessment of the green coffee supply chain, including not only growers but also exporters and processors (clean process - cooperatives, wash stations). These previously identified in the literature but not related to the design and implementation of the sustainability requirements.

NFI – New factor identified

Sustainability has equal importance in the supplier's evaluation (self-evaluation and audits)

6.3.3 Sustainability diffusion through supplier performance assessment

6.3.3.1 Design of supplier sustainability performance assessment

"Beverage B" runs two supplier performance assessment programmes for the green coffee and industrial suppliers, which are also driven by the green coffee supply chain certification and the procurement procedure (OF1 – Sustainability strategies), respectively.

The green coffee certification demands that "Beverage B" must monitor and improve the sustainability performance of its coffee suppliers. The certified body also audits suppliers to assess "Beverage B"'s initiatives (evaluation, assessment and development). Again, this certification is related to the capability of "Beverage B" to address sustainability across the green coffee supply chain, not a certification for suppliers (e.g. to certify compliance). The green coffee supplier performance assessment takes into consideration the sustainability practices established in the contract and more specific agriculture sustainability practices (Table 6.8). The purpose of the assessment (OF16) is to ensure compliance with the contract and improve the sustainability performance. The measures were defined by the coffee procurement department, considering the typologies of markets, specificities of the national regulation of the countries and technicians' observations during the visits and ILO standards (OF18 and OF7). Depending on the supply chain configuration, "Beverage B" assesses the exporters and processor and a sample of growers (at least 10% of the population of growers). In Brazil, where the supply chain is more integrated, all growers are assessed annually (OF17).

In terms of the assessment of industrial suppliers, "Beverage B" has focused on assessing how industrial suppliers manage their environmental aspects (OF16). The same self-environmental evaluation questionnaire used in the supplier selection is adopted. There are two questionnaires used: one for suppliers certified to ISO 14001 and/or EMAS and another for those not certified. The first one aims to identify significant environmental aspects (e.g. water usage, hazardous substances usage, wastewater, air emission, waste, odours). For that, a list of environmental aspects is presented and suppliers need to assess their significance (e.g. high, mean, and low). The questionnaire for non-certified suppliers aims to monitor suppliers' environmental management initiatives, including regulation and management/control (Table 6.8). A scale 1-4 is embraced, representing non-implementation of the measures to the top level of adoption (use of documented procedure to control of the environmental aspects from productive activities, maintenance and emergencies). All first tier industrial suppliers are assessed once every two years. The measures were defined by the quality department in collaboration with the procurement team (OF3) and in accordance with the environmental management system implemented (OF21).

Table 6.8 (p. 96) compares the performance assessment programmes for coffee and industrial suppliers. Overall, the performance assessment for coffee suppliers covers both environmental and social practices with focus on improving compliance and the sustainability performance (OF17). For industrial suppliers, most of them located in Europe, the assessment focuses on their environmental management practices. As mentioned previously, social issues are evaluated during the audits to select new suppliers. Interestingly, according

to the research and innovation manager, “the European suppliers comply with environmental and social regulation which is more restricted, for example in terms of child labour or atmospheric pollution”. This suggests that social issues are not considered by “Beverage B” to be a significant concern in Europe.

Table 6.8: Sustainability practices used in the supplier selection and performance assessment in the green coffee supply chain and industrial suppliers (“Beverage B”).

Criteria	**Sustainability measures for selection and performance assessment**	
Suppliers assessed (OF17)	Coffee growers & cleaning processors (1st & 2nd tier)	Industrial suppliers
Purpose (OF16)	Compliance and general improvement in performance	Compliance
Mechanisms (OF22)	2nd party audits	Self questionnaire and third party audit
Influential factors in the design	OF1, OF4, O 7 & OF19	OF1, OF3, OF4, OF19 & OF21
Environmental measures	***Coffee growers*** - Compliance with regulation - Soil management - Average temperature rainfall - Shade-grown coffee - Integrated agriculture - Fertilization - Use of pesticides and chemicals - Harvest (method, density) - Agricultural technologies employed - Natural reserves and protection of endemic species - Biodiversity - Water management (source, volume and quality) - Certifications - Chemical management ***Coffee cleaning processors*** Compliance with regulation - Water management (source, volume and quality) - Wastewater treatment (technology employed, volume) - Drying process (e.g. method, temperature - Packaging - Warehouse (temperature) - Hygiene - Equipment - Chemical management	- Environmental regulation (Compliance and procedure identify the environmental regulation) - Environmental management function (formalisation of an internal function with rules and responsibilities for environmental management) - Environmental aspects (Environmental aspects considered as being significant for the suppliers.) - Environmental control (Operational control of activities that influence the environmental impacts, including maintenance activities and emergency situation)
Social measures	- Compliance with the labour regulation - Human rights - Working conditions - Public health facility - Risk of accidents or injures - Wages - Cost Analysis - Workers competencies - Impact on local community (e.g. social projects) - Wages - Cost Analysis - Workers competencies - Impact on local community (e.g. social projects)	Not monitored.

6.3.3.2 Performance assessment implementation

The green coffee suppliers are assessed through 2nd party audits conducted once every three years (OF22). This is compulsory for suppliers (OF24) and in cases where non-compliance is identified; the supplier is revisited to check the implementation of an action plan. More than 1500 growers were audited between 2010 and 2014. The expenses of the visits and initiatives to develop suppliers are covered by “Beverage B”, representing a multi-million investment. During the audit, the coffee technicians also map the best practices implemented to solve problems and to increase the sustainability performance. They also commonly diffuse the best practices used by the growers to solve common problems in specific areas when the improvement plan is discussed. This helps the firm to ensure not only compliance with environmental and labour regulation but also to support individual producers to address sustainability and best practices in the improvement plans (OF29, OF30 and OF31).

In Brazil the growers are assessed annually. Interestingly, they are responsible for around 50% of the total of green coffee purchased. In other regions, if no serious issues are identified during the assessment of the sample of growers, another country is prioritised, after two years the suppliers are reassessed. According to the coffee procurement director, “Beverage B” has built a consistent database, including the main problems faced by the growers, the practices implemented and how they are improving the performance. This enables “Beverage B” to understand the regional risks and plan the supplier development initiatives (next section), as well as diffusing the best practices implemented by the growers.

The coffee supplier performance assessment is also periodically reviewed in order to cope with the specificities of different regions where the green coffee is supplied, such regulation and common practices adopted. This is uncovered as a new organisational factor affecting the diffusion of both environmental and social sustainability practices across the green coffee suppliers (OF38). This helps to ensure the adoption of realistic measures which are progressively more stringent. Therefore, the constant review of performance assessment measures is critical for “Beverage B” to enhance the diffusion of practices.

Regarding the industrial suppliers, the self-environmental evaluation questionnaire is available on the online platform and suppliers are responsible for filling it in every two years. The environmental manager (quality department) controls the information flow and conducts the analysis of the questionnaire answered. Industrial suppliers are then classified as insignificant, not very significant, significant and very significant. For the last two, a close examination and instructions in terms of best practices to control the environmental aspects and audits need to be run (Figure 6.4) (p. 98). A total of 50 suppliers are monitored, 12 of them are certified by ISO 14001 and/or EMAS. To date “Beverage B” has not been faced with suppliers sorted as significant or very significant according to the environmental manager. Around 20 suppliers have been audited by a third party firm once a year (OF6 – engagement of stakeholders), including different dimensions of performance (e.g. quality). Regarding sustainability, the aim is to evaluate how suppliers manage their environmental aspects, impact and compliance with the regulation. These suppliers are selected based on the volume of business and importance.

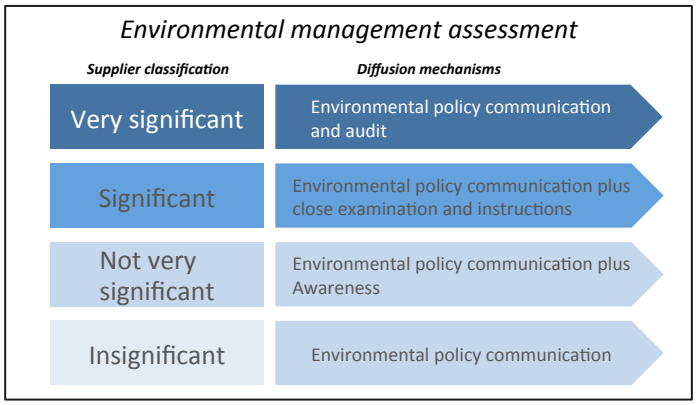


Fig. 6.4: Diffusion mechanisms based on the performance assessment outcomes ("Beverage B").

Table 6.9 (p. 99) presents the organisation factors related to the design and implementation of the supplier performance assessment. Interestingly, the factors OF27 (understanding supplier capability) and OF30 (collaborative approaches with suppliers) are critical only for diffusion of practices for green coffee suppliers. The green coffee performance assessment is constantly reviewed in order to ensure measures are realistic, within the context of different regions. This is found to be a new organisational factor influential for sustainability diffusion through performance assessment (OF38). It is important to note that the engagement of stakeholders was not influential for design the measures, but third part audit firms are engaged to assess key industrial suppliers.

6.3.4 Sustainability diffusion through supplier development

6.3.4.1 Design of supplier sustainability development

This section is split into development initiatives for green coffee and industrial suppliers (Table 6.10) (p.100). Driven by the certification scheme, "Beverage B" has addressed its supplier development initiatives for green coffee suppliers (OF34) with emphasis on meeting compliance, improving performance and building capability related to sustainability (OF32). This is made by transferring knowledge, awards and joint initiatives (OF33).

Transferring knowledge is more systematically adopted by "Beverage B", including educating initiatives, such as long-term courses focusing on farm business management, short-term courses on quality issues and seminars (e.g. water conservation, wastewater treatment, biodiversity, integrated agriculture). The educating initiatives have occurred especially in Brazil, India, Colombia, Costa Rica and Ethiopia. This is usually arranged in a central location to cover as many suppliers as possible. Cooperatives and exporters are also trained in terms of sustainability issues and tools for coffee quality control. "Beverage B" has also distributed to suppliers from all regions handbooks on management of natural reserves and biodiversity, reforestation, water management and human rights. The Coffee University, "Beverage B"'s education centre to promote, support and disseminate best practices for high-quality coffee, is responsible for running the transferring knowledge initiatives to growers in collaboration with

the coffee procurement department (OF4). According to the green coffee senior manager "transfer knowledge is our way that we see sustainability, we can improve the growers' skills". The outcomes of green coffee supplier performance assessment are also used to plan the content of seminars in specific regions (OF35). The individual results of the assessment are also used to develop and implement improvement plans in the farm.

Table 6.9: Organisational factors for sustainability diffusion through the performance assessment ("Beverage B").

SCM		Organisational factors	Sustainability Practices	
			Environ.	Social
Supplier performance assessment	Design	Definition of performance assessment purpose (OF16)	X	X
		Definition of suppliers to be assessed (OF17)	X	X
		Definition of consistent performance measures (OF18)	X	X
		Sustainability requirements (OF19)	X	X
		Measurement systems implemented (OF20)	NI[1]	NI[1]
		Management systems implemented (OF21)	X[b]	NI[2]
		Buying firm's sustainability policy and strategy (OF1)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X[b]	NI[2]
		Engagement of external stakeholders (OF6)	NI[1]	NI[1]
		Use of industry code/guideline/principles/initiatives (OF7)	X[a]	X[a]
		Collaborative approaches with suppliers (OF30)	NI[1]	NI[1]
	Implementation	Performance mechanisms (OF22)	X	X
		Training purchasing staff on sustainability (OF23)	X	X
		Understanding of benefits and risk of sharing information (OF24)	X	X
		Enhanced communication with suppliers (OF25)	X	X
		Strengthened relationship (OF26)	X	X
		Understanding suppliers' capability (OF27)	X[a]	X[a]
		Support of suppliers' top managers (OF28)	*NI*[3]	*NI*[3]
		Supporting and assisting suppliers in the assessment (OF29)	X	X
		Collaborative approaches with suppliers (OF30)	X[a]	X[a]
		Feeding back supplier performance assessment (OF31)	X	X
		Cross-functional integration (OF3)	X[b]	X[b]
		Support of top and middle managers (OF4)	X	*NI*[3]
		Engagement of external stakeholders (OF6)	X[b]	X[b]
		Internal capabilities (OF11)	X	X
		Review of supplier sustainability performance assessment (OF38)	***NFI***	***NFI***

[Environ.] Environment

X – Factors identified through empirical evidences (both for green coffee and industrial suppliers)

X[a] – Evidenced only for the green coffee suppliers

X[b] – Evidenced only for the industrial suppliers

NI – Not identified

NI[1] – OF25, OF6 & OF30 were not identified as influential in the design of the supplier performance assessment programmes.

NI[2] – OF4 (i.e. quality and procurement) and OF21 (i.e. environmental management system) were influential for the design of the environmental questionnaire used to assess industrial suppliers' performance.

NI[3] – The integration between the procurement and quality department was influential for the design and implementation of the environmental questionnaire to assess industrial suppliers.

NI[4] – OF28 was not identified as being influential in the implementation of the supplier performance assessment in both performance programmes.

NFI – New factor identified

The green coffee supplier assessment programme is periodically reviewed.

Table 6.10: Design of supplier sustainability development initiatives ("Beverage B").

Suppliers (OF34)	Sustainability practices diffused / Purpose (OF32)	Initiative (OF33)	Supplier sustainability performance assessment (OF35)	Other factors evidenced as influential in the design of the initiative
Coffee growers	Meeting, compliance, improving performance and building capability	Transferring knowledge (educating – annual training & technical assistance)	Outcomes used to plan the initiatives	OF1, OF3, OF7 and OF17
	Improving performance	Award	Top-performing suppliers are recognised.	OF1, OF3, and OF17
Packaging suppliers	Redesign of packaging (materials, light weighting)	- Co-design of machine and packaging – Collaborative approach with suppliers to study the feasibility of the purpose.	Not evidenced.	OF1, OF3, OF4*, OF5 and OF30 * Production, marketing, R&D & procurement

The growers who sell coffee for two years running become members of the "Beverage B" club in Brazil. Currently 450 growers are members of the club and are the target of knowledge transferring initiatives (e.g. educating and handbooks). Top performing suppliers are awarded based on their involvement in these initiatives and also the outcomes of the annual sustainability performance assessment. This includes a substantial financial prize and a trip to visit the "Beverage B"'s facilities in Italy. The award also aims at identifying the best producers and best practices implemented by them. During the educating initiatives, the best practices identified are disseminated, such as reforestation programmes and smart wastewater treatment. The green coffee procurement director believes that "the award initiative is influential in strengthening the relationship with suppliers. For instance, there are growers that sell to "Beverage B" for more than 25 years".

Some practices are further investigated and diffused in a more structured way. This is made through an integration with the "Beverage B"'s University of Coffee. For example, a more efficient centrifuge used to dry coffee was found in Brazil. The impact of this technology on the quality of the green coffee bean and the final product (coffee) was investigated. The same quality standards were evidenced and the practice was diffused through the educating initiatives. The coffee procurement director believes that "exchanging ideas and expertise is a way that innovation occurs and is disseminated".

A pilot project has been developed in Colombia through a joint initiative with a local coffee grower association in order to introduce a production of honey (bee-keeping) as an alternative source of income. This initiative is developed with support of the "Beverage B" Foundation, a non-profit organisation mostly focused on developing projects on ethics, sustainability and culture. Bee-keeping was set up and the growers, especially the growers' wives, were trained by "Beverage B" about the management and technical aspects.

Regarding the industrial suppliers, the development initiatives are mostly aimed at packaging suppliers through collaborative approaches for designing and implementing new packaging (OF30, OF32, OF33 & OF34). For that, the R&D department liaise with the procurement, production and marketing department to develop new ideas (OF4). Interestingly, the ideas also come from

active suppliers, which are engaged in workshops to discuss innovative solutions for improving packaging.

6.3.4.2 Supplier sustainability development implementation

The development initiatives of green coffee suppliers have significantly impacted supplier performance and capability. More than 5000 participants attended the educating initiatives between 2009 and 2014, improving the access to knowledge and enhancing capabilities to improve critical sustainability issues. For instance, in India, “Beverage B” focused on promoting seminars and distributing handbooks on water management (e.g. irrigation, efficient equipment and fertilization) and the best practices (e.g. environmental – biodiversity in the plantation, water, wastewater and waste management; social – working conditions and human rights). The same effort was made in Brazil with more attention paid to wastewater treatment and in Costa Rica regarding biodiversity. These were themes

This effort to transfer knowledge, as well as the implementation of improvements plans based on the outcomes of performance assessment has enhanced the diffusion of the best practices across the supplier base as can be seen in Figure 6.5. It is important to note that the number of suppliers which adopted the best practices increased significantly between 2009 and 2012. According to the total quality director “this is our business model, collaborating with suppliers, integrating with the university of coffee to create value to the product and growers”. The outcomes of the performance assessment have been used to assess the impact and update the development initiative (OF36).

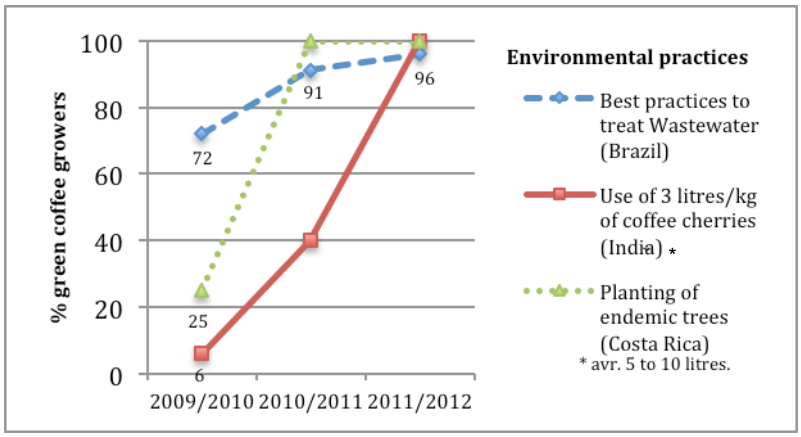


Fig. 6.5: Diffusion of environmental practices across the supplier base (“Beverage B”). Source: CSR report 2012, 2013 and 2014.

The packaging improvement initiatives are made through collaborative approaches with suppliers based on two flows: “Beverage B”’s ideas/needs and ideas that come from suppliers. In an example captured related to the first flow, “Beverage B” decided to design a new packaging made of plastics moving away from steel. According to R&D this packaging would be lighter, have the same functionality and would have an impact of 30% less carbon. “Beverage B” then found a packaging supplier that would be able to make the packaging. The machinery supplier was also engaged to co-design a new machine for this new packaging. One of the most significant contributions of this co-design was to solve a problem of the pressure stabilisation inside the packaging. “Beverage B”

patented the final product and has exclusive rights to make the packaging, which is the way to manage the risk of this initiative (OF39).

"Beverage B" also runs innovation workshops to discuss new packaging ideas with suppliers, such as packaging with less material. According to the procurement director "sometime the ideas also came from our suppliers and our duties is to bring it to our company and discuss with our team - production, marketing, R&D, to check if it is feasible and workable". For example, plastic lamination was eliminated from packaging, reducing cost and environmental impact. The procurement director also considered that "this was a win-win approach and we strengthened the relationship with the supplier". Moreover, "Beverage B" also introduced a recyclable box for a capsule that can be reused based on a supplier's idea.

Table 6.11 presents the organizational factors that affect the diffusion of sustainability practices. The support of top and middle managers, internal capabilities, enhanced communication and collaborative approaches with suppliers are influential for both green coffee and industrial suppliers. Overall, the sustainability development initiatives have been influential in building a stable supplier base.

Table 6.11: Organisational factors for sustainability diffusion through the supplier development ("Beverage B").

SCM		Diffusion factors	Sustainability Practices	
			Environ.	Social
Supplier development	Design	Definition of supplier development purpose (OF32)	X	X
		Definition of development Initiative (OF33)	X	*X*[a]
		Definition of suppliers to be engaged (OF34)	X	X
		Supplier sustainability performance assessment (OF35)	*X*[a]	*X*[a]
		Buying firm's sustainability policy and strategy (OF1)	*X*[a]	*X*[a]
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	*X*[a]
		Products and/or components characteristics/risk (OF5)	*X*[b]	*NI*[1]
		Internal implementation of sustainability practices (OF8)	*NI*[2]	*NI*[2]
		Sustainability requirements (OF19)	*X*[a]	*X*[a]
		Collaborative approaches with suppliers (OF30)	X	*X*[a]
	Implementation	Assessment of the impact of the supplier development initiative (OF36)	X	*X*[a]
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	*X*[a]
		Internal capabilities (OF11)	X	X
		Training purchasing staff on sustainability issues (OF23)	*X*[a]	*X*[a]
		Enhanced communication (OF25)	X	X
		Strengthened relationship (OF26)	X	X
		Understanding suppliers' capability (OF27)	X	*X*[a]
		Support of suppliers' top managers (OF28)	NI[3]	NI[3]
		Collaborative approaches with suppliers (OF30)	X	X
		Risk management (OF39)	***NFI***	*NI*

[Environ.] Environment

X – Factors identified through empirical evidences (both for green coffee and industrial suppliers)

X[a] – Evidenced only for the green coffee suppliers

X[b] – Evidenced only for the industrial suppliers

NI – Not identified

NI[1] – OF5 was considered influential in the collaborative approaches for designing new packaging. Simplified LCA supports the design process (e.g. selection of materials, volume).

NI[2] – OF8 were not identified as being influential in the design of the supplier development initiatives.

NI[3] – OF28 was not evidenced.

NFI – New factor identified

Risk management in the co-design of the new packaging (environmental improvements) and machine is made through patent and contracts.

6.4 CASE STUDY 3 – "Cosmetics A"

6.4.1 Brief company description

The third case study was conducted in a Brazilian cosmetics firm, which is called "Cosmetics A" here. The firm has manufacturing facilities in Brazil, Argentina, Colombia and Mexico. "Cosmetics A" is listed in the Down Jones Sustainability Index[9] and was rewarded by the Ethisphere as the world's most ethical company in the cosmetics sector. "Cosmetics A" is also a member of the Union for Ethical Bio Trade (UEBT)[10]. The firm is also certified by ISO 14001 and B Corp certification[11].

The firm specialises in producing cosmetics, perfumes, and personal care products, which are characterised by the use of ingredients from the Brazilian biodiversity, for example from the Amazon Forest. Around 220 new products are released per year, which represents a 30% of renewal of the product portfolios. For that, there is a massive investment in research and development of new applications for the ingredients or new biodiversity ingredients. The UEBT standards are applied in the research and development processes, taking into consideration the conservation of biodiversity and the equitable sharing of benefits across the suppliers in either the extraction/cultivation (production phase) or ingredient prospection (research phase).

The firm has also implemented the 2050 sustainability vision, which provides sustainability guidelines to be followed by 2050 and commitments and targets to be met by 2015. The use of biodiversity ingredients, traceability of the biodiversity ingredients, the use of recycled and recyclable materials in the packaging and are the core sustainability practices covered in the vision, which are influential in the engagement of suppliers.

"Cosmetics A"'s supplier base is split into industrial suppliers and service suppliers (e.g. transport, marketing service, IT) and biodiversity ingredients suppliers. The industrial suppliers consist of biodiversity extract processors, chemicals, packaging and final product and organisational souvenirs (outsourced processes). Around 83% of the materials come from plants of the Brazilian biodiversity; the rest includes chemical and petrochemical oils. The firm does not include ingredients that come from animal origin or synthetic ingredients. The firm uses 26 different biodiversity ingredients/raw-materials provided by 38 biodiversity ingredient cooperatives/associations of growers and agro-extractive families.

Three different configurations of biodiversity ingredient supply chains were identified depending on the specificity of the plant/fruit and the complexity to extract the ingredient. In the first configuration the cooperative/association

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[9] Down Jones Sustainability Index (DJSI) releases annually the ranking of leading sustainability firms taking into consideration financial, environmental and social performance of the firms included in the Down Jones Global Index. To be listed in the DJSI the firms need to be best in class in their sector.

[10] UEBT is a non-profit association which promotes standards for sourcing biodiversity ingredients based on local development, biodiversity conservation, and business growth

[11] B Corp certification is led by the non-profit organisation B Lab, which promotes highest standards of verified social and environmental performance, public transparency, and legal accountability.

extracts and processes the biodiversity ingredient. It represents 27% of the total list of ingredients, such as Cupuaçu, Murumuru and Ucuuba. Secondly, intermediate processors are involved. They are usually close to the production area (cultivation/extraction); hence after harvesting the plants/fruits have to be processed in the same day in order to keep the quality of the ingredient. This configuration covers 58% of the ingredients (e.g. Pitanga, Passion fruit, Macela). Lastly, four ingredients need to be handled by two different processors (Priprioca, Pataqueira, Sapucainha and Estoraque). For example, the cooperative/association produces and harvests the priprioca roots and sends them to a processor which extracts the essential oil. Then, the oil is sent to a second processor responsible for making the priprioca fragrance. Finally, the fragrance is sent to "Cosmetics A". In order to simplify these configurations, it is assumed that the cooperative/association suppliers are placed in the 2nd tier and the processors in the 1st tier (Figure 6.6).

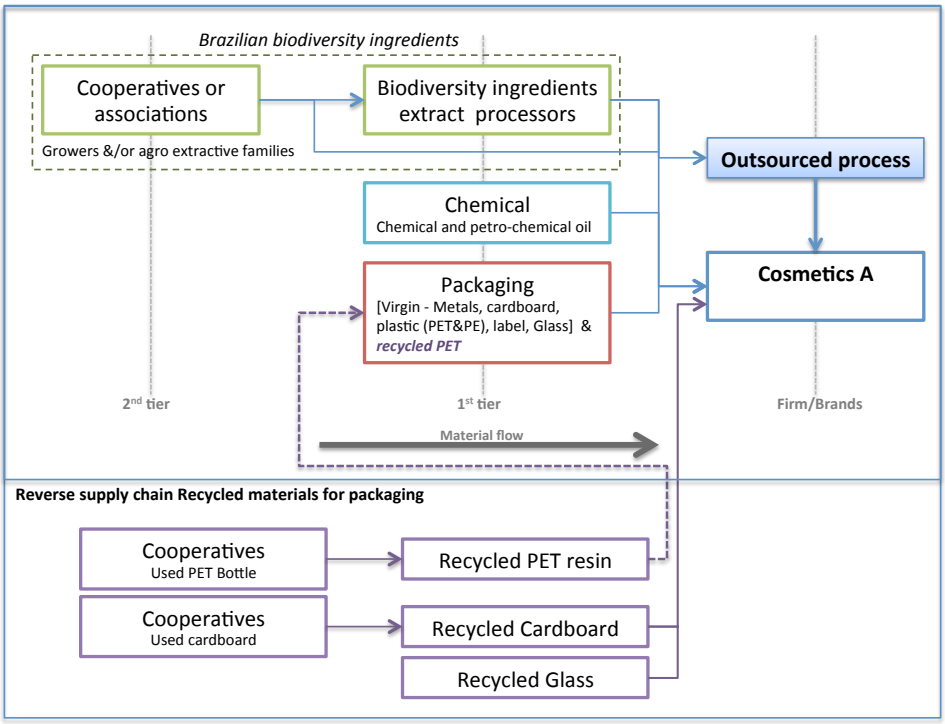

Fig. 6.6: "Cosmetics A"'s supplier base.

Regarding packaging suppliers, the key materials sourced are metals, cardboard, plastic (e.g. PET and PE), labels and glass. The firm also uses recycled materials, including PET, cardboard, and glass. The recycled glass is provided directly to "Cosmetics A" by an industry which recycles glass bottles. Cooperatives of waste pickers operate the municipal waste source-segregation scheme in Brazil[12]. They provide used PET bottles to the recycled PET resin

[12] In Brazil, municipal waste used to have as the final destination areas without any environmental control (e.g. soil protection, collection and treatment of methane gas and leachate). In these areas, it was common to find a lot of informal waste pickers, including children working in very precarious conditions. Then, proper landfill started operating and a new national law on waste management was released in 2010 (Law 12305/2010), encouraging the municipalities to create recyclable waste sorting plans and employ the informal waste pickers. Most of the waste sorting plans in Brazil are operated by cooperatives of waste pickers.

supplier. The resin is sent to one of the PET plastic suppliers to provide the PET recycled packaging (primary packaging). The cardboard has a similar flow; however, the recycled cardboard is sent directly to “Cosmetics A”. The three materials are represented in Figure 6.6 as being part of the reverse supply chain of recycled materials for packaging.

6.4.2 Sustainability diffusion through supplier selection

6.4.2.1 Design of sustainability requirements

“Cosmetics A” requires the environmental and social sustainability practices that industrial suppliers need to implement by using a specific suppliers’ code of conduct and guideline manuals (Table 6.12, p. 106). The supplier code of conduct establishes the principles of the relationship with suppliers (e.g. transparency, mutual respect and trust) and requires compliance with the sustainability practices prioritised by “Cosmetics A”. Overall, this covers human rights, working conditions and health and safety, compliance with environmental regulation and adoption of environmental practices related to water, energy, natural resources and waste and air emission.

The specific guideline manuals are adopted according to the supplier typology (e.g. ingredients processors and chemical suppliers and, final products and souvenirs – outsourced process). Interestingly, these manuals list the sustainability practices, noting whether they are mandatory, highly recommended or optional. The manual includes, as mandatory sustainability practices, the adoption of environmental performance measurements (e.g. water and energy usage and waste and air emission), code of ethics and the engagement of their suppliers to comply with regulations related to child and forced labour. It is important to note that these practices are not compulsory in accordance with the Brazilian regulation. This can therefore influence suppliers to progress their sustainability management maturity level by going beyond compulsory sustainability practices. Furthermore, the manual covers other performance dimensions, such as quality, hygiene and production facility standards, storage and transportation. The supplier code of conduct and the guidelines manual therefore provide in details the list of sustainability requirements that industrial suppliers need to comply with.

“Cosmetics A” also adopts the policy of sustainable use of the biodiversity and traditional knowledge for biodiversity ingredients in cooperatives/associations. This policy provides principles for selection and relationship with the cooperatives or associations. It also includes rules regarding the phase of bioprospection and ingredients extraction/cultivation, sharing of benefits, and how the cooperatives or associations will be monitored. The sustainability practices listed in the document are regarding compliance with regulation, conservation of the ecosystem, health and safety and management.

Overall, the supplier code of conduct, the guideline manuals and the biodiversity ingredients policy specify both environmental and social practices that suppliers need to implement. This also describes how sustainability is considered by “Cosmetics A” (OF2) and how to measure suppliers compliance (OF9). They are aligned with the 2050 sustainability vision (OF1). The design of the code and the guidelines manual was based on the support of top managers

(OF3) and integration of the main functions, which have interactions with suppliers (OF4) (i.e. quality, operations, sustainability, procurement and logistics). The environmental and social practices implemented internally were also influential in the design of the requirements (OF8) (e.g. environmental and social corporate management systems). The policy of sustainable use of biodiversity and traditional knowledge is in line with the UEBT standards (OF7).

Table 6.12: Sustainability practices diffused through the supplier selection ("Cosmetics A").

Practices	Supplier code of conduct	Guideline manual
Environment	- Adoption of best practices for water management, reducing the natural resource consumption, energy management, waste disposal and air emissions. - Compliance with the environmental regulation and governmental authorizations (environmental and labour). - Commitment to share the code with suppliers.	Compliance with environmental regulation (e.g. Environmental and safety Authorizations) (M) Environmental policy (HR) Environmental aspects assessment (HR) Water management (e.g. Measure the water usage, drainage system) (M) Waste water treatment system (e.g. operation and compliance with regulation) (M) Air emission inventory (M) Environmental emergency situations (e.g. procedure to respond to potential environmental emergency situation and accident) (HR) Environmental performance measurement (e.g. water and energy usage and waste and air emission) (M) Chemical management plan (M)
Social	*Human rights* - Non-child labour - Non-forced labour - Freedom of association and collective negotiations - Non-discrimination and harassment	Adopt a Code of ethics (M) Promote the human rights (M) Freedom of association (M) Non-discrimination (HL) Forced labours (M) Formal policy against child labour (M) Implement social inclusion programme (employment of disabled people) (HL) Engage suppliers to comply with regulation related to the child labour (M) Engage suppliers to comply with regulation related to the forced labour (M)
	Working conditions - Wages and benefits - Health and safety (procedure and regular training)	Comply regulation related to working hours and wages (M) Health and safety management in accordance with regulation (M) Procedure to identify risk (M) Report incident (M) Use of personal protection equipment (M) Fire fighting system (M) Training employees (M)
[M] Mandatory / [HR] Highly recommended		

6.4.2.2 Implementation of sustainability requirements

The procurement department consists of different teams, including procurement (selection, price and conditions negotiation), supplier relationship and performance, biodiversity ingredient cooperatives/associations relationship and performance and recycled materials teams. Different strategies to implement the sustainability requirements were found according to the supplier typology. "Cosmetics A" formally communicates the supplier code of conduct all suppliers

(OF10) through its homepage and supplier platform, as well as, when issuing the tender or product development stage. The procurement team is responsible for selecting industrial suppliers, issuing the tender and qualifying suppliers for the final evaluation. The qualification takes into consideration aspects such as cost, the history of the relationship (e.g. sustainability, quality, delivery), and sustainability. The procurement team adopts the self-sustainability evaluation questionnaire, which is used in the supplier performance assessment programme (next section). According to the procurement manager, the use of the self-evaluation supports the decision process and encourages suppliers to invest in environmental and social sustainability practices, as captured below:

> *"This is a evaluation that helps us to compare suppliers and make them thinking about environmental and social issues […] we also send them [all suppliers evaluated] the results of the self-evaluation and they can see areas for improvements. In general, we have seen investments made by them to reduce the water and energy usage. We have influenced suppliers to implement best practices". [Procurement manager].*

A qualified supplier then is evaluated through 2nd party audits conducted by the quality department. The audit protocol includes a financial assessment, sustainability and risk management. Regarding sustainability, the protocol encompasses compliance with the requirements and regulation, control of environmental aspects (e.g. usage of water, energy, waste management) and social responsibility (e.g. policies, training, health and safety, chemical management). The completed self-sustainability evaluation questionnaire is checked. Third-party audits can also be employed following the same protocol. Finally, the relationship is formalised through contracts, which embrace the terms and conditions, such as specific sustainability clauses and compliance with the supplier code of conduct.

Based on the research conducted by the R&D department the biodiversity ingredient supply chain is indicated to the procurement team. The cooperatives/associations, which are already selected and developed, are prioritised in new product projects or when the order of biodiversity ingredients is increased. New suppliers are included when the current ones are not able to meet the order or project specifications. The procurement team negotiates directly with the biodiversity ingredients' cooperatives/associations and/or intermediate processors with regard to the delivery conditions and the final price based on the production cost and a fair profit. Moreover, "Cosmetics A" shares the benefits of using the biodiverse genetic resources following the Brazilian regulations. When an intermediate processor is involved, they need to have a direct contract with the cooperative/association to take into consideration the price and delivery conditions negotiated by "Cosmetics A".

In 2014 a team was included in the procurement department specifically for the reverse supply chain. The recycled material team is responsible for managing the demands of recycled packaging, selecting and developing suppliers, mapping the traceability of the materials and meeting their 2020 commitment. According to the 2050 sustainability vision, "Cosmetics A" is committed to use 10% of recycled materials and 74% recycled materials in the packaging by 2020. Currently 20% of recycled glasses are used in the composition of the packaging. "Cosmetics A" has also used rPET resin. One of the product portfolios has currently used 100% of resin, reducing 72% of CO_2

emissions from the packaging. The recycled glass supplier recycles glass bottles discarded by Brazilian beer industries. The recycled cardboard comes from a FSC certified supplier, which buys used cardboard from one waste picker cooperative. In line with the FSC standards the supplier has monitored and developed the cooperative. Finally, the recycled PET resin supplier receives the used bottles from six cooperatives. These cooperatives have been evaluated and developed by "Cosmetics A". The evaluation was based on the audit protocol used for industrial suppliers and the protocol for biodiversity ingredients suppliers. Based on the results, action plans were developed and have been implemented through collaborative approaches (section 6.5.4).

Table 6.13 (p. 109) presents the organisational factors identified in the supplier selection. "Cosmetics A" seeks to influence suppliers to consider sustainability practices by communicating the supplier code of conduct and the guideline manuals about what it is and how the sustainability practices are prioritised (OF9 and OF10) (online platform, support during tender issuing). Both 1st (industrial) and 2nd tier (biodiversity ingredients) suppliers and recycled material supplier (reverse logistics) are covered in the evaluation, which includes people from Procurement, Quality and R&D departments (OF4 and OF13).

Moreover, in the qualification phase sustainability is considered equally with other dimensions (e.g. cost, quality) (OF37). The scope of the implementation of sustainability requirements covers suppliers in the first and second tier (OF13) by employing 2nd party audits, which take into consideration the sustainability requirements (OF10) and using contracts (including sustainability clauses and the supplier code of conduct) (OF14). This helps the firm to ensure the traceability of the materials, including the recycled materials used in the packaging.

6.4.3 Sustainability diffusion through supplier performance assessment

6.4.3.1 Design of supplier sustainability performance assessment

"Cosmetics A"'s supplier sustainability performance assessment involves three programmes (Table 6.14, p. 110). A self-sustainability evaluation questionnaire is managed by the supplier relationship and performance team to monitor the environmental and social performance of industrial suppliers (OF16). The questionnaire was designed with the support of a consultancy firm (OF6). All industrial suppliers are invited to answer the questionnaire (OF16) and the score achieved by them is used in the performance management system for key suppliers. It encompasses traditional dimensions of performance, such as quality (e.g. compliance with the guideline manual), logistics, competitiveness (e.g. cost, prices, medium- and long-term agreements) and sustainability (based on self-sustainability evaluation questionnaire). Key suppliers are sorted based on the spending and the risk assessment, which considers criticality of the material provided, the strategy of the product portfolios (e.g. continuity), potential continuity based on the history of purchasing (e.g. quality and delivery) and supplier's capabilities for innovation. The outcomes of this performance programme are used to plan the educating initiatives and also in the award programme (section 6.4.4).

The second programme focuses on compliance with the sustainability requirements (OF16) by using follow-up audits conducted by the quality department. All industrial suppliers are assessed based on the same protocol used in the supplier selection (OF17). The quality team designed the measures in accordance with the supplier code of conduct and 2050 vision (OF1 and 17). Moreover, the Brazilian regulation and the standards commonly used in the cosmetics industry such as ISO9000, ISO14001 and SA8000 were taken into consideration in the design of the protocol (OF21).

Table 6.13: Organisational factors for sustainability diffusion through the supplier selection ("Cosmetics A").

SCM		Organisational factors	Sustainability Practices	
			Environ.	Social
Supplier selection – sustainability requirements	Design	Buying firm's sustainability policy and strategy (2020 sustainability Plan) (OF1)	X	X
		Providing a clear meaning of sustainability (OF2)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	X
		Products and/or components characteristics/risk (OF5)	*NI*[1]	*NI*[1]
		Engagement of external stakeholders (OF6)	*NI*[1]	*NI*[1]
		Use of industry code/guideline/principles/initiatives (OF7)	X	X
		Internal implementation of sustainability practices (OF8)	X	X
		Basis for measuring supplier compliance (OF9)	X	X
	Implementation	Clear communication of sustainability requirements (OF10)	X	X
		Supplier's evaluation (OF11)	X	X
		Internal capabilities (OF12)	X	X
		Scope for implementation of sustainability requirements (OF13)	X	X
		Volume of business with suppliers (OF14)	*NI*[2]	*NI*[2]
		Use of contract (OF15)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	X
		Engagement of external stakeholders (OF6)	X[a]	X[a]
		Training purchasing staff on sustainability issues (OF23)	***PI***[2]	***PI***[2]
		The equal importance of sustainability in the evaluation (OF37)	***NFI***	***NFI***

[Environ.] Environment

X – Factors identified through empirical evidences (industrial and biodiversity ingredients cooperatives/associations)

X[a] – Evidenced only for the industrial suppliers

NI – Not identified

NI[1] – OF5 & 6 were not evidenced as influential in the design of the sustainability requirements.

NI[2] – All new industrial and biodiversity ingredients suppliers regardless of the volume of business are evaluate before becoming a business partners.

PI – Previously identified

PI[1] – Use of the guidelines of the UEBT standards for the design of biodiversity ingredients policy;

PI[2] – Procurement team were trained to run the self-sustainability evaluation questionnaire and about the biodiversity policy to deal with the specificities with the biodiversity ingredients supplier chain (e.g. cooperatives/association, intermediate processors, risk).

NFI – New factor identified

Sustainability has the same weight in the supplier selection. The self-sustainability evaluation questionnaire is used to support the decision process.

Finally, the third programme undertakes biodiversity ingredients' cooperatives/associations and is run by the biodiversity supplier relationship and performance. All cooperatives/associations are included in the assessment (OF17), which covers organizational management, traceability, working conditions, good manufacturing practices and use and conservation of

biodiversity (OF16). The measures were designed in collaboration with UEBT and considered "Cosmetics A'"s policy of sustainable use of the biodiversity and traditional knowledge.

Table 6.14: Supplier sustainability performance assessment programmes ("Cosmetics A").

Criteria	Self-sustainability evaluation	Industrial suppliers Audits	Biodiversity ingredients audits
Suppliers assessed (OF17)	- All Industrial suppliers are invited to answer the questionnaire (voluntary) - Key suppliers (voluntary) - 1st tier suppliers	- All Industrial suppliers (compulsory) - 1st tier suppliers	- All cooperatives/associations (compulsory) - 2nd tier suppliers
Purpose (OF16)	- Monitor the sustainability performance	- Compliance with the sustainability requirements - Validation of self-evaluation - Understanding the suppliers' capabilities	- Compliance with the requirements - Monitor the sustainability performance - Traceability
Mechanisms (OF22)	- Self-evaluation	- 2nd party audits	- 2nd party audits
Influential factors in the design	OF1, OF3, OF4, OF6 and OF19	OF1, OF3, OF4 and OF19	OF1, OF3, OF4, OF6, OF7 and OF19
Environmental measures	- Energy sources and consumption - Water sources and consumption - Wastewater management (volume and treatment) - Waste management (volume, treatment & final disposal) - Recycled material	- Compliance with the code of conduct and guideline manual (requirements) - Compliance with regulation - Control of environmental aspects (e.g. usage of water, energy, waste management) - Fire safety - Chemical management	- Compliance with regulation - Use and conservation of the ecosystem - Environmental agriculture practices - Good manufacturing practices - Fire safety - Control of environmental aspects - Chemical management
Social measures	- Investments in formal education and training for employees - Rate of incidents (H&S) - Inclusion of disable employees in the workplace - Apprenticeship - Investment in society (health, education, environment)	- Social responsibility (e.g. policies) - Training, - Health and safety - Human rights - Chemical management	- Compliance with regulation - Working conditions (H&S, labour aspects) - Human rights - Labour relationship – families and cooperatives/association

6.4.3.2 Implementation of supplier sustainability performance

A total of 138 industrial suppliers are assessed through the self-sustainability evaluation programme twice a year. They represent 70% of the spending. Most of them are packaging suppliers (44%), followed by materials suppliers – biodiversity ingredients extract provided by intermediate processors and chemicals (32%) and final product – outsourced processes (24%). The completed questionnaires are reviewed by the relationship and performance team which sends a report back, comparing the supplier with the average score of the category, the supplier's progress and the progress of the category. The team also supports suppliers in filling the questionnaire or clarifying answers (OF29). A manual on how to fill the questionnaire is also provided. The majority of suppliers are also engaged in discussing the results (OF25 and OF31).

Interestingly, the assessment is not compulsory but suppliers are interested in taking part in the assessment in order to strengthen the relationship (OF24). It is also evidenced that the assessment influences suppliers to implement sustainability strategies, as captured below:

> *"This assessment is not mandatory, but when suppliers agree with the conditions of the programme, they seek to progress in the score […] There is no sense to monitor suppliers that does not intend to build a long term relationship with us […] our feedback and personal contact is also essential in the suppliers' engagement, helping them to understand the outcomes of the assessment and adding value. This helps them to define their sustainability strategies. We have seen the implementation of sustainability practices driven by our feedback, such as social inclusion programme related to the employment of disabled people, biomass as a source of energy and reuse of wastewater treated. This is enabled by enhanced communication that the assessment provides and when they share the same sustainability value, they are more likely to invest in improvements". [Supplier relationship and performance manager].*

Of the 138 suppliers who completed the self-evaluation, 80 of them are sorted as key suppliers. Key suppliers have priority in the supplier selection for new product projects. Consequently, this allows them to build a close relationship. However, according to a supplier relationship manager, "key suppliers, which lose the volume of business with "Cosmetics A", are demotivated to carry on the effort to measure and improve the sustainability performance". This suggests that the volume of business is an influential factor to keep suppliers active in the sustainability performance assessment programme. This is a previously identified factor in the literature as being influential in the supplier selection (OF14).

The audit programme is compulsory and covers all industrial suppliers, which are assessed in every three-years time (OF24). Around 200 audits are conducted per year and suppliers are responsible for paying the audit cost with the exception of small ingredients extract processors. The quality department usually carries out the audits and promotes workshops to all auditable suppliers when the audit protocol is updated. Third party audit firms also conduct audits based on the same protocol (OF6). According to the manager responsible for the supplier audits programme "the audits help us to check the answers of self-evaluation questionnaire, understand supplier capability and identify topics where the suppliers are more proactive or achieve more progress, as well as risk" (OF27). Suppliers, which had restrictions on the selection, must provide action plans, which are ratified and monitored by "Cosmetics A". The most common issues evidenced during the audits are related to the lack of updated environmental authorization provided by the local government.

All biodiversity ingredients cooperatives/associations are assessed annually through 2nd party audits conducted by the biodiversity ingredients relationship and performance team. The 28 cooperatives/associations are made up of more than 3,200 families and to deal with the specificities of each community and ensure a proper communication and build a trustful relationship, the biodiversity team consists of interdisciplinary professionals, including social scientists, anthropologists, agronomists and environmental managers. The common issues are related to waste management, lack of a map of the properties (e.g. extraction/cultivation areas and environmental protection area), lack of knowledge of the environmental regulations (e.g. Brazilian forestry code) and food safety. Non-compliances identified are treated by the development of

action plans designed and implemented through collaborative approaches between the suppliers and “Cosmetics A” (OF29 and OF30). For instance, “Cosmetics A” supports the suppliers by development actions, including investment and training (section 6.4.4).

“Cosmetics A” has also developed a geographic information system (GIS) for real-time management of environmental and social data about the associations/cooperatives. This tool supports the monitoring process, allowing online access to information on the ingredients supplied, the processors which receive the ingredient, families’ data and environmental and social data. For example, in terms of family data, the system covers a number of members, level of education, incomes, labour aspects and relationship with the association/cooperative, human rights issues (e.g. child or forced labour). Environmental data covers extraction or cultivation areas, endangered species, environmental protection area and deforestation. The GIS also allows the information on the families and cooperative/association to be updated in the field. This helps ensure traceability of the biodiversity ingredients.

Table 6.15 (p. 113) presents the organisation factors related to the design and implementation of the supplier sustainability performance assessment. The evidence suggests that most of the factors are influential for diffusion of both environmental and social sustainability practices across “Cosmetics A”’s supplier base. To sum up, the sustainability diffusion through performance assessment occurs through the self-sustainability evaluation programme and 2nd party audits. Industrial suppliers are actively engaged in the feedback (reports and meeting) of the self-evaluation. Audits are used to validate the answer of the self-evaluation questionnaire and to assess compliance with the requirements, which cover sustainability practices that are not compulsory according to Brazilian regulations. Action plans need to be designed and implemented by the industrial suppliers to treat non-compliances. Ingredients suppliers are assessed more frequently (once per year) than industrial suppliers (once every three years) and receive more support in the creation and implementation of action plans to treat non-compliances.

6.4.4 Sustainability diffusion through supplier development

6.4.4.1 Design of supplier sustainability development

“Cosmetics A”’s sustainability development initiatives are also settled according to the supplier categories (Table 6.16, p. 114). Industrial suppliers are engaged through educating initiatives with a focus on improving the sustainability performance. Based on the self-sustainability evaluation, the supplier relationship and performance plans the content of the training, frequency and suppliers to be engaged (categories and maturity level). All monitored suppliers are invited to attend the training about sustainability measures covered in the self-assessment. Key suppliers have received specific training and are engaged in the relationship satisfaction survey, including the suggestion for training. Biodiversity ingredients and waste pickers cooperatives/associations are developed with an emphasis on compliance, improving performance and capabilities. The next section will focus on the implementation of the development initiatives.

Table 6.15: Organisational factors for sustainability diffusion through the performance assessment ("Cosmetics A").

SCM		Organisational factors	Sustainability Practices	
			Environ.	Social
Supplier performance assessment	Design	Definition of performance assessment purpose (OF16)	X	X
		Definition of suppliers to be assessed (OF17)	X	X
		Definition of consistent performance measures (OF18)	X	X
		Sustainability requirements (OF19)	X	X
		Measurement systems implemented (OF20)	*NI*[1]	*NI*[1]
		Management systems implemented (OF21)	*NI*[1]	*NI*[1]
		Buying firm's sustainability policy and strategy (OF1)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	X
		Engagement of external stakeholders (OF6)	*X*[a]	*X*[a]
		Use of industry code/guideline/principles/initiatives (OF7)	X[b]	X[b]
	Implementation	Performance mechanisms (OF22)	X	X
		Training purchasing staff on sustainability (OF23)	X	X
		Understanding of benefits and risk of sharing information (OF24)	X	X
		Enhanced communication with suppliers (OF25)	X	X
		Strengthened relationship (OF26)	X	X
		Understanding suppliers' capability (OF27)	X	X
		Support of suppliers' top managers (OF28)	X[b]	X[b]
		Supporting and assisting suppliers in the assessment (OF29)	X	X
		Collaborative approaches with suppliers (OF30)	X	X
		Feeding back supplier performance assessment (OF31)	X	X
		Cross-functional integration (OF3)	X	X
		Support of top and middle managers (OF4)	X	X
		Engagement of external stakeholders (OF6)	*X*[a]	*X*[a]
		Internal capabilities (OF11)	X	X
		Volume of business with suppliers (OF14)	***PI***	***PI***

[Environ.] Environment

X – Factors identified through empirical evidences (industrial and biodiversity ingredients cooperatives/associations)

X[a] – Evidenced only for the industrial suppliers

X[b] – Evidenced only for the biodiversity ingredients cooperatives/associations

NI – Not identified

NI[1] – OF20 and OF21 were not identified as influential in the design of the supplier performance assessment.

PI – Previously identified

The volume of business apparently influences key industrial suppliers' effort to measure and improve the sustainability performance.

Table 6.16: Design of supplier sustainability development initiatives ("Cosmetics A").

Suppliers (OF34)	Sustainability practices diffused / Purpose (OF32)	Initiative (OF33)	Supplier sustainability performance assessment (OF35)	Other factors evidenced as influential in the design of the initiative
Industrial suppliers	Improving performance in the self-evaluation programme	Transferring knowledge (educating – annual training)	Activity are planned based on the performance of supplier category	OF1, OF3, OF4*, OF7 and OF17 * Sustainability & Procurement
		Award	Top-performing suppliers are recognised.	OF1, OF3, and OF17
Packaging suppliers	Improving packaging	Joint plan	LCA supports the analysis of new packaging projects presented by suppliers	OF1, OF3, OF4*, OF5, OF7 and OF30 * R&D, Marketing & Procurement
Biodiversity ingredients cooperatives (all suppliers are involved)	Compliance (biodiversity policy), improving performance & Building capabilities	Transferring knowledge (educating – annual training & Technical assistance)	The outcomes of the assessment is used to plan educating activities & technical assistance	OF1, OF3, OF4 and OF17 * R&D, Marketing & Procurement
	Improving performance	Award	Top-performing cooperative/associations are awarded.	OF1, OF3, and OF17
	Compliance, improving performance.	Investment and joint plan	Performance assessment supports the development of actions plan.	OF1, OF3, OF17 and OF30
Biodiversity ingredients first processors	Building capabilities – traceability and good manufacturing practices, self-sustainability evaluation tool	Transferring knowledge (Technical assistance) They are also engaged in the initiatives for industrial suppliers	The outcomes of the assessment is used for technical assistance	OF1, OF3, OF4*, OF17 and OF30 * Sustainability & Procurement
Waste picker cooperatives	Compliance & Building capabilities	Transferring knowledge (educating – annual training & Technical assistance)	The outcomes of the assessment is used to plan educating activities & technical assistance	OF1, OF3, OF4*, OF17 and OF30 * Sustainability & Procurement

6.4.4.2 Supplier sustainability development implementation

Industrial suppliers are engaged in educating initiatives, which cover subjects related to the self-sustainability evaluation measures. The training has helped suppliers to improve the measurement of their performance by employing proper tools or techniques. This initiative has also been influential for implementing sustainability practices (e.g. biomass energy usage, wastewater reuse, social inclusion programmes). The sustainability department provides support for the educating initiative, especially in more technical subjects, such as waste management (OF4). Top-performing key industrial suppliers are also recognised through an annual award. This programme considers the best supplier, best suppliers by category (e.g. quality, logistics, innovation, competitiveness and sustainability) and best supplier in terms of progress achieved in the categories.

Key packaging suppliers are challenged to present proposals of new packaging according to “Cosmetics A”’s needs and technical specifications (e.g. less volume and weight, recycled materials). “Cosmetics A” assesses the proposals presented based on compliance with the specifications, cost, environmental impact (e.g. emissions and weight) and esthetical criteria. Different functions are involved to assess the proposal, such as R&D, marketing and operations. Through collaborative approaches with the supplier the proposal selected is reviewed and the project is implemented. Non-disclosure agreements are used with suppliers in the development phase and exclusivity contract for a while during commercial phase (OF39). Figure 6.7 presents an example of the implementation of aerosol deodorant packaging based on collaborative approaches with suppliers. For the same efficiency and 50% less packaging volume, the new packaging reduced carbon emission by 48% and used 15% less material.

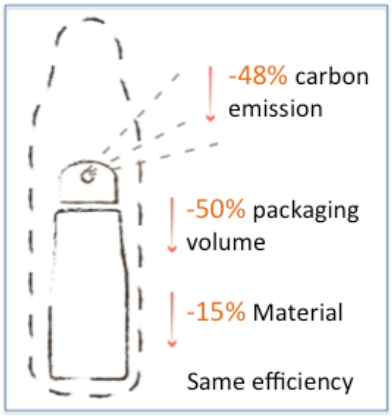

Fig. 6.7: Improved packaging through collaborative approaches with supplier. Source: Annual report 2014.

The educating initiatives have focused on empowerment and leadership of the biodiversity ingredients cooperatives/association and sustainability (Table 6.17, p. 116). These help the cooperatives/associations to develop their capability to promote the local development, ensure the environmental conservation and strengthen the supply chain. The biodiversity ingredients relationship manager believes that “keeping the families involved in the extraction activities in the traditional livelihoods helps to conserve the forest, creating value”. It is important to note that there is an intense deforestation process in the Amazon forest caused by the timber industry, cattle grazing, and cultivation of exotic species. “Cosmetics A” seeks to ensure a proper investment of the incomes from the sharing the benefits of using biodiversity ingredients. The local development and empowerment, infrastructure, environmental conservation, and how the benefit is shared between the families are key aspects covered in the training. The performance assessment outcomes are also used to plan the knowledge transferring initiatives. The educating initiatives are promoted annually and supported by the biodiversity ingredients relationship team. Top-performing cooperatives/associations are annually awarded based on the outcomes of the performance assessment. Action plans are designed and implemented through collaborative approaches between “Cosmetics A” and the cooperatives/associations to treat non-compliance and improve performance. “Cosmetics A” usually makes investments to support

suppliers to treat the non-compliance, for instance by contracting specialised consultancy to conduct compulsory studies according to Brazilian regulations (e.g. health and security risk map and mitigation). Technical support is also provided to improve food safety standards, elaboration of property maps, and reforestation, including endangered plants. These initiatives are influential in increasing the suppliers' capabilities and are enabled by enhanced communication (OF25) and strengthened relationship (OF26), and as captured below:

> *"these initiatives are enabled by the strengthened relationship that we have with these suppliers, which has been built based on trust, transparency and information exchange [...] These efforts add value and change the reality of the cooperatives/association, increasing quality of the ingredients and their autonomy. [Biodiversity ingredients relationship manager].*

Table 6.17: Transferring knowledge initiatives with biodiversity ingredients cooperatives/associations ("Cosmetics A").

Dimension	Sustainability practices
Empowerment and leadership	- Leadership - Sharing benefits - Project management - Management and finances - Improvements in infrastructure and local value creation
Environmental sustainability	- Environmental conservation - Waste management - Ingredients diversification in the cultivation - Food safety - Good manufacturing practices - Use of local organic compost
Social sustainability	- Health and safety - Child labour - Local development

Finally, "Cosmetics A" has also developed the waste pickers associations by transferring knowledge. The key issues identified in the sustainability evaluation have been addressed through training or technical assistance. This includes health and safety aspects, human rights (child and teenage labour issues), traceability of used materials and manufacturing plant layout and productivity.

Table 6.18 (p. 117) presents the organisational factors, which are influential in supplier development initiatives. Interestingly, most of the factors identified are used for diffusion of both environmental and social sustainability practices across both industrial and biodiversity ingredients suppliers.

Table 6.18: Organisational factors for sustainability diffusion through the supplier development ("Cosmetics A").

SCM		Diffusion factors	Sustainability Practices	
			Environ.	Social
Supplier development	Design	Definition of supplier development purpose (OF32)	X	X
		Definition of development Initiative (OF33)	X	X
		Definition of suppliers to be engaged (OF34)	X	X
		Supplier sustainability performance assessment (OF35)	X	X
		Buying firm's sustainability policy and strategy (OF1)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	X
		Products and/or components characteristics/risk (OF5)	X[a]	NI[1]
		Internal implementation of sustainability practices (OF8)	X[a]	NI[1]
		Sustainability requirements (OF19)	X	X
		Collaborative approaches with suppliers (OF30)	X	X
	Implementation	Assessment of the impact of the supplier development initiative (OF36)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	X
		Internal capabilities (OF11)	X	X
		Training purchasing staff on sustainability issues (OF23)	X	X
		Enhanced communication (OF25)	X	X
		Strengthened relationship (OF26)	X	X
		Understanding suppliers' capability (OF27)	X	X
		Support of suppliers' top managers (OF28)	X	X
		Collaborative approaches with suppliers (OF30)	X	X
		Risk management (OF39)	NFI	NI[3]

[Environ.] Environment

X – Factors identified through empirical evidences (industrial and biodiversity ingredients cooperatives/associations)

X[a] – Evidenced only for the industrial suppliers

NI – Not identified

NI[1] – OF5 was considered influential in the collaborative approaches for design of new packaging. Simplified LCA supports the design process (e.g. selection of materials, volume).

NI[2] – OF8 was not evidenced in the supplier development.

NI[3] – Contracts with packaging suppliers are used in the development and implementation of new packaging. The improvements focus on the environmental dimension.

NFI – New factor identified

Risk management in the co-design of the new packaging is made through the use of contracts of exclusivity.

6.5 CASE STUDY 4 – "Textile A"

6.5.1 Brief Company description

The last case study was carried out across the apparel supply chain of a sport clothes brand. "Textile A" is one of the world's leading sports performance and lifestyle brands with major business in footwear and apparel. It operates 54 businesses in over 30 countries in America, Europe and Africa, Asia and Oceania. The brand has employed regional and global sourcing strategies. For instance, garment manufacturers are sourcing by regional offices, whereas fabrics are sourcing by the global office. The scope of this case study is the European apparel office, responsible for designing and developing the products sold in Europe and Africa, and sourcing the garment suppliers. Data was also included from one of the key garment suppliers and fabric supplies.

"Textile A" is a member of industry affiliations that promote sustainability across the textile sector, for instance the Sustainable Apparel Coalition (SAC)[13] and the Apparel and Footwear International Restricted Substances List Management Group (AFIRM Group)[14]. The firm is listed in the Dow Jones Sustainability Index. "Textile A" has operated a global corporate social responsibility (CSR) department since 2004. Three sustainability areas have been prioritised, namely reducing environmental impacts throughout the value chain, improving chemicals management in its supply chain, and improving labour practices in its supply chain. The regional apparel offices have a specific CSR team. The European apparel office has also adopted the use of recyclable material or less aggressive fabrics (e.g. cocona fabric, which is a natural and chemical-free fabric).

The European apparel office has a seasonal cycle of production that includes the design process, selection of fabric and sourcing garment suppliers. More than 300 different apparel products are produced every season. The supplier base consists of the garment manufacturer (outsourced process in the first tier) (around 25 suppliers, located especially in Asia, e.g. China and Indonesia) and the material suppliers (2nd tier) (Figure 6.8).

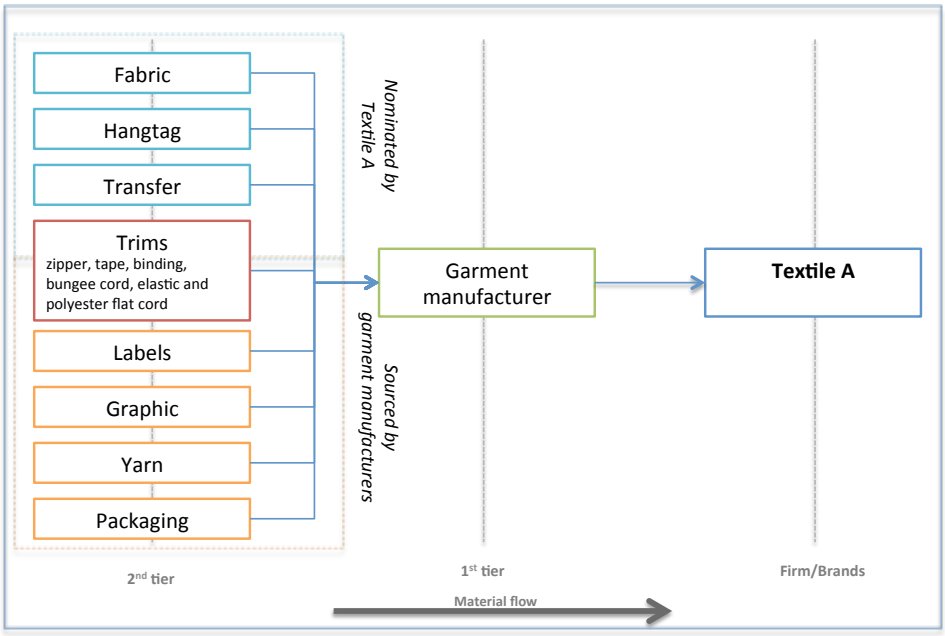

Fig. 6.8: "Textile A"'s supplier base.

The list of materials includes fabrics (e.g. knit stretch, recycled stretch mess, knit), trims (e.g. zipper, tape, binding, bungee cord, cord stopper, elastic and polyester flat cord), transfer (e.g. applique and boning), graphic, hang tags and labels. All fabric, transfer and hang tag suppliers are nominated by "Textile A". Trims are partially nominated by "Textile A" and sourced be the garment suppliers. The garment suppliers are responsible for sourcing the labels,

[13] The SAC is an industry-wide group working to reduce the environmental and social impacts of apparel and footwear products around the world.

[14] AFIRM group addresses the reduction of the use and impact of harmful substances in the apparel and footwear supply chain.

graphics, yarn and packaging according to the products' design and quality specifications.

6.5.2 Sustainability diffusion through supplier selection

6.5.2.1 Design of sustainability requirements

"Textile A"'s sustainability requirements emerge from the manufacturing manual. This manual provides specifications concerning the products, the trademarks, the sustainability requirements, the purchase order process and quality control. In terms of sustainability, the manual encompasses three requirements: the policy of engagement and the chemical control and use standards and material management guideline. The global office designed these requirements and the regional offices need to follow them.

The policy of engagement (PoE) sets out the minimum requirements for the environmental management (e.g. compliance with regulation and practice to reduce waste), the protection of human rights, and working conditions including health and safety (Table 6.19) (OF2 and OF9). The PoE was designed taking into account "Textile A"s global code of conduct and the corporate social responsibility policy (OF1). International standards, which are broadly adopted in the textile sector, were also considered, such as World Federation of the Sporting Goods Industry (WFSGI), ILO standards and Fair Labour Association (FLA)[15] guidelines (OF7).

Table 6.19: Sustainability practices diffused through the supplier selection ("Textile A").

Practices	Policy of engagement
Environment	- Compliance with the laws applicable to the business operations. - Monitor environmental performance (not specified the measures). - Pollution minimization and waste reduction. - Use efficient of resources and energy. - Reduce emissions and the use of hazardous substances.
Social	*Human rights* - Prohibition of forced labour - Prohibition of child labour - Prohibition of harassment and abuse - Non-discrimination - Freedom of association and collective bargaining
	Working conditions - Compensations (minimum wages or prevailing wage in the industry and overtime) - Hour of work (at maximum 60 hour per week – regular and overtime working hours, 24 consecutive hours off in every seven-days period and paid annual leaves required by the applicable law) - Health and safety (adequate lighting, temperature control and air ventilation systems, training, emergency situation, PPE and sanitary facilities).

The chemical management standards puts forward some responsibilities for suppliers for preventing the product contamination with hazardous chemicals during the manufacturing process, caring for employees in terms of the safety aspects regarding hazardous chemicals and controlling emissions from facilities. Relevant limit values for substances which may be found in the products, recommended test methods and a list of product materials that may

[15] FLA is a non-profit organisation, which focuses on labour rights and improved working conditions especially across the apparel supply chain.

have a higher risk of containing the substance, are also specified. Also, there are some substances which are not allowed to be present in the products made, such as asbestos, dioxins and furans. This programme was designed considering the REACH standards[16]. The average of the industry alliance norms was also considered.

The material management guideline provides specifications related to the material origin and animal welfare. The prohibition of using materials originating from wild–caught animals or endangered species cannot be challenged by suppliers. Additionally, the use of real fur or pelts, pigskin and the adoption of leather that originated from live or aborted animals or from cattle raised in Amazon biome has been banned. Leather and skin, down and feathers and wool must originate from suppliers with good animal husbandry. Materials from animals must be clearly labelled and the documents related to these must be kept and shared in order to ensure traceability.

Therefore, the policy of engagement, the chemical control and use standards, as well as material management guidelines are the sustainability requirements adopted by "Textile A". The next section will focus on their implementation.

6.5.2.2 Implementation of sustainability requirements

Different approaches were found in terms of the implementation of the requirements. Overall, the requirements are communicated to the garment suppliers and the nominated suppliers in the 2nd tier (e.g. fabrics, trims, hangtags and transfer) (OF10).

The selection of the garment suppliers is based on an integration of different departments of the European apparel office (OF3 and OF4). The sourcing team is responsible for negotiating (price, delivery terms, and quality) and booking the raw material (fabric and trims). The regional CSR team conducts the supplier sustainability evaluation. When sourcing starts the negotiations, sustainability information is requested, such as the existence of policies (e.g. code of conduct and environmental policy), last third party audit and standards (ISO14001, SA8000, WRAP - Worldwide responsible accredited production[17] and Blue Sign[18]). According to the CSR manager (European office) "if one supplier does not have a certificate, it does not mean that it is a bad supplier or does not have an environmental or social management system". Interestingly, in terms of the certification of the management systems, the manager considers that a WRAP certificate is more commonly accepted in Apparel manufacturing than ISO 14001. More emphasis on social issues (e.g. covers human resources management, health and safety) is given by WRAP certificate whereas environmental management is related to compliance with the environmental regulation.

[16] REACH is an European Union regulation regarding the registration, evaluation, authorization, and restrictions of chemicals.

[17] WRAP is an independent, non-profit team that promotes workplace standards through a social compliance certification program for the apparel/textile industry. In 2013, around 1900 facilities from 50 countries got the certificate.

[18] Bluesign is an emerging standard in the textile sector with focus on environmental health and safety in terms of the use of chemicals.

Garment suppliers are then evaluated against the sustainability requirements (e.g. policy of engagement and chemical management standards) though 2nd party audits conducted by the CSR team. Based on the evaluation, the business can either proceed or if there is non-compliance or below standard performance then these need to be addressed by the supplier before the formalisation.

The legal department coordinates the formalisation of the relationship with the selected suppliers and the renewal of the contract with previous suppliers by signing the contract and the manufacturing manual (OF15). Interestingly, the CSR manager considered the use of contracts as being critical for sustainability diffusion, as captured below:

> *"there is no authority to request the adoption of sustainability standards; hence there is no contract made. If we don't sign a contract with those suppliers, it is very difficult to tell them or force them. There is no basis to collaborate with them, we may know who they are but it is not easy to look at sustainability improvement. I think if you are trying to improve labour or environmental standards with partners in your supply chain, you need motivation for them to do so or at least a reason for starting a discussion with them, and that usually starts with the fact that you have a business relationship".* [CSR manager – European office].

Once a formal business relationship is established, the European apparel office continuously monitors suppliers in accordance with a large array of requirements. This aspect will be discussed in the next section.

Concerning the nominated suppliers in the 2nd tier, there is a variance of the key dimension of performance considered in the evaluation. For instance, quality, cost and lead-time are considered for trims, transfers and hangtags. Regarding the sustainability, there is no supplier evaluation against the sustainability requirements. However, the sourcing team usually checks if the suppliers are certified in terms of chemical management, such as Bluesign and Oekotex[19]. The sourcing manager believes that the lack of the evaluation is a risk, but this has been managed by at least checking the environmental certifications. The policy of engagement and chemical programmes (Chemical management and material management) are also communicated. After negotiating with these suppliers, the European apparel office recommends them to garment suppliers to buy the list of materials according to the conditions negotiated (including price, quantity and quality).

The relationship between the nominated suppliers and garment suppliers is managed by the service provider (Agent) (OF6), especially for fabrics and trims suppliers. Delivery deadline and quality standards are the main dimension of performance monitored by the agent, which needs to make sure that fabrics and trims suppliers follow "Textile A"'s standards. The agent is located in the same territory where products are made. According to the CSR manager (European office) "they have a lot of day to day contact and support garment manufacturers to understand our sustainability standards, they are a very important partner to get the message across with our supplier".

Garment suppliers also need to make sure that non-nominated suppliers comply with the regulation and diffuse "Textile A"'s sustainability requirements

[19] Oekotex certificate is related to the limits of harmful substances in the materials, covering Japanese and European standards (e.g. REACH).

to non-nominated suppliers. This is stated in contract and the strengthened relationship with the garment suppliers (e.g. long term and trust) enable the diffusion of the standards as captured below:

> *"we share with our vendors all the policies and test requirements and they to make sure when they suggest certain trim for us that the trims meet our requirements. It is very clearly stated in the agreement with the vendor […] we are partners for a long time, and we help each other, we trust each other, so the trust and partnership are critical for compliance and the continuity of the business"* [Product development manager – European office].

The garment supplier studied ("Garment A") employs quality and capacity criteria when it needs to select a new supplier (non-nominated suppliers). "Garment A" also communicates its supplier engagement policy (sustainability requirements), which covers human rights, safety, and environmental protection aspects. The policy was designed considering the standards of the brands. Overall, the requirements are aligned with "Textile A"'s policy of engagement. However, the firm does not evaluated or monitored the suppliers against the requirements. "Garment A" usually selects the risky material suppliers (i.e. chemical risk) that have an updated Oeko-Tex certificate. In general, according to the managing director "the graphic suppliers are able to demonstrate compliance with safety and human rights standards. They also provide materials to big brands".

A global sourcing strategy for fabric suppliers began in 2015. The global apparel office selects fabric suppliers according to the needs of the regional offices. The selection is reliant on the balanced scorecard, which includes quality, capability for innovation, delivery, cost and sustainability. The global CSR team evaluates suppliers based on the policy of engagement and chemical standards. Then the relationship is formalised based on contracts with sustainability clauses (compliance with the sustainability requirements and local regulation). The supplier evaluation and the use of contracts are new mechanisms adopted that strengthen the relationship, as captured below:

> *"We have started having direct contracts with fabric suppliers and this gives us a bit more leverage and allows us to build a better relationship. We already have a good relationship with fabric suppliers because they are so critical for the product [...] making the standards clear and the audits are important to transfer our sustainability standards".* [CSR manager – Global apparel office].

The fabric supplier studied ("Fabric A") did not employ a formal sustainability requirement in the selection of its suppliers. On the other hand, the same practice of requesting a copy of the updated Bluesign or Oekotex certificates adopted by "Garment A" and "Textile A" was evidenced. "Fabric A" requests the certificates from the yarn suppliers and outsourced process (i.e. dye house and weaken process). According to the marketing manager the facility in Taiwan (where the fabric is purchased) is certified by Bluesign and Oekotex (copies of the certificates were not provided neither was information found on the firm's homepage). The marketing manager explained that they received a lot of pressure from the brands to implement these standards and the certificates allow the firm to demonstrate its chemical management approach. Moreover, environmental and social sustainability standards are requested by the brands, including labour standards, human rights, water usage and wastewater management.

Apparently, the certification Oekotex and Bluesign have commonly been implemented by suppliers in the second tier (e.g. fabric, trims and yarn). These standards have been requested by both brands, garment suppliers and fabric suppliers, even when the firm does not have a structured procurement process, for instance with selection of suppliers based on sustainability requirements. The certificates also help a supplier to demonstrate that they meet chemical standards (e.g. REACH).

Table 6.20 provides the organisational factors related to the design and implementation of "Textile A"'s sustainability requirements. To sum up, the communication of the sustainability requirements encompasses the 1st tier suppliers (Garment) and the nominated suppliers in the 2nd tier (Fabrics, Hangtags, transfers and some trims). The supplier evaluation and formalisation in turn occurs only with garment and fabric suppliers by using a different sourcing strategy, i.e. regional offices evaluate and formalise the relationship / with the garment suppliers while the global apparel office selects fabric suppliers (OF11, OF12 and OF13). In both cases, it was evidenced that sustainability is strongly considered in the evaluation, which is conducted by the CSR teams (regional and global) (OF37).

Table 6.20: Organisational factors for sustainability diffusion through the supplier selection ("Textile A").

SCM		Organisational factors	Sustainability Practices	
			Environ.	Social
Supplier selection – sustainability requirements	Design	Buying firm's sustainability policy and strategy (OF1)	X	X
		Providing a clear meaning of sustainability (OF2)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	X
		Products and/or components characteristics/risk (OF5)	NI[1]	NI[1]
		Engagement of external stakeholders (OF6)	NI[1]	NI[1]
		Use of industry code/guideline/principles/initiatives (OF7)	X	X
		Internal implementation of sustainability practices (OF8)	NI[1]	NI[1]
		Basis for measuring supplier compliance (OF9)	X	X
	Implementation	Clear communication of sustainability requirements (OF10)	X	X
		Supplier's evaluation (OF11)	X	X
		Internal capabilities (OF12)	X	X
		Scope for implementation of sustainability requirements (OF13)	X	X
		Volume of business with suppliers (OF14)	NI[2]	NI[2]
		Use of contract (OF15)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	X
		Engagement of external stakeholders (OF6)	X	X
		Training purchasing staff on sustainability issues (OF23)	X	X
		The equal importance of sustainability in the evaluation (OF37)	***NFI***	***NFI***

[Environ.] Environment

X – Factors identified through empirical evidences

NI – Not identified

NI[1] – OF5, OF6 and OF8 were not found as being influential in the design of the requirements.

NI[2] – All potential suppliers (Garment and fabrics) regardless of the volume of business are evaluated against sustainability requirements before becoming a business partners.

NFI – New factor identified

Sustainability has equal importance in the supplier's evaluation.

6.5.3 Sustainability diffusion through supplier performance assessment

6.5.3.1 Design of supplier sustainability performance assessment

"Textile A"'s supplier sustainability performance assessment focuses on garment suppliers (1st tier) and more recently on fabric suppliers (2nd tier) (OF17) (Table 6.21, p. 125). For garment suppliers, two programmes were identified. The first one aims at compliance with the policy of engagement and chemical standards. The regional CSR teams, following the audit protocol used in the supplier evaluation, coordinate the assessment. Interestingly, the global office designed the audit protocol (measures) taking into consideration the sustainability requirements (OF19) and the global code of conduct (OF1). Moreover, the regional CSR and sourcing teams were engaged (OF4).

The second programme is coordinated by the regional sourcing team and emphases efficient fabric usage in order to reduce fabric waste. According to the manager of the programme "this allows us to reduce cost hence we are responsible for paying the fabrics and suppliers to improve fabric consumption". This is calculated by the relationship between the amount of fabric to be incorporated in the product (total of parts of the product) and the total fabric bought. Eight suppliers have been engaged according to a product selected. These suppliers are responsible for making the product, which represents a basic set of "Textile A"'s apparel.

The performance assessment for fabric suppliers is in an early stage and recently the performance measures were designed and approved. The global CSR team will annually assess all fabric suppliers following an audit protocol. The design of the protocol took into consideration the sustainability requirements (OF17) and regional CSR and sourcing teams were involved in the design (OF4).

6.5.3.2 Performance assessment implementation

The garment supplier audits are compulsory and the costs are covered by "Textile A" (OF11 and OF24). The audits can be also conducted by third party firms located in Asia, following "Textile A"'s protocol. According to the CSR manager the local audit firms are familiar with "Textile A"s protocol and have expertise in the local regulation (OF6). Findings are shared, identifying issues and planning corrective actions through discussions with the top management team to ensure support and capability.

The CSR team usually provide suggestions for improvements and sharing best practices. It is expected that minor non-compliance should be solved before the auditors leave or this can be followed up through email contact, CSR visits or visits by another team (e.g. sourcing) (OF4). A corrective action plan needs to be established to resolve major non-compliances. In this case, further audits will take place to verify remediation until all violations are settled. According to the CSR manager (European office) "the audits help suppliers to identify gaps or weakness and enable us to create a better communication channel and strengthen the relationship with suppliers and unions".

Table 6.21: Supplier sustainability performance assessment programmes ("Textile A").

Criteria	Garment suppliers Audits	Marker efficiency	Fabric suppliers Audits
Suppliers assessed (OF17)	All garment suppliers	Specific garment suppliers	All fabric suppliers
Purpose (OF16)	Compliance with the sustainability requirements	Reduce fabric waste	Compliance with the sustainability requirements
Mechanisms (OF22)	2nd party audits (regional CSR team) (3rd party can also be employed)	Email exchanges (regional sourcing team)	2nd party audits (Global CSR department)
Influential factors in the design	OF19	OF3 and OF4	OF19
Environmental measures	- Fire safety (e.g. equipment, evacuation routes, local authorisation, training, fire fighting procedures) - Environmental authorization - Chemical management (e.g. storage, labelling, ventilation PPE, eye wash station)	Fabric usage efficiency based on the fabric cut plan	- Fire safety (e.g. equipment, evacuation routes, local authorisation, training, fire fighting procedures) - Demonstration of compliance with the local regulation - Environmental authorization - Environmental policy - Environmental management system not certified - Certifications (ISO 14001) - Chemical management (e.g. storage and use standards, labelling, inventory) - Chemical management certification (e.g. Oekotex)
Social measures	- Existence of code of conduct - Awareness on the code of conduct to the employees - Prohibition of child labour - Prohibition of forced labour - Prohibition of harassment and abuse - Non-discrimination - Women's health (Providing to pregnant employees adjusted task & reduced working hours) - Freedom of association and collective bargaining - Wages & benefits - Working hours & overtime - Machinery safety (e.g. maintenance) - PPE - Sanitary facilities, comfort and hygiene (e.g. drinking water, clean toilets)	-	- Certifications (SA8000, WRAP, ISO26000, OHSAS 18001) - Social responsibility reports - Prohibition of forced labour - Prohibition of harassment and abuse - Non-discrimination - Noise measurement - Machinery safety (e.g. maintenance)

Based on the last two audits conducted at “Garment A”’s facilities, progress in the supplier sustainability performance was evidenced. Environmental management, forced labour, benefits and freedom of association were the measures that achieved the top score. Chemical safety had the best progress, moving from score-2 in 2012 to score-4 in 2014 (Figure 6.9). This was based on the execution of a CAP to implement a secondary containment for chemicals in the storage area. Improvements were also made in ventilation and chemical labeling. The environmental practices implemented were related to the maintenance of update environmental authorization from the government and implementation of performance management programme for energy and waste (measure and target to reduce). Regarding social practices, for instance forced labour and freedom of association, the best practices implemented were the inclusion of the topics in its code of conduct, the use of a documented procedure for overtime, which included the use of a specific application form and the principle of voluntary application, collective bargaining agreement and an arrangement that workers have employee representatives in the factory and representatives are freely elected.

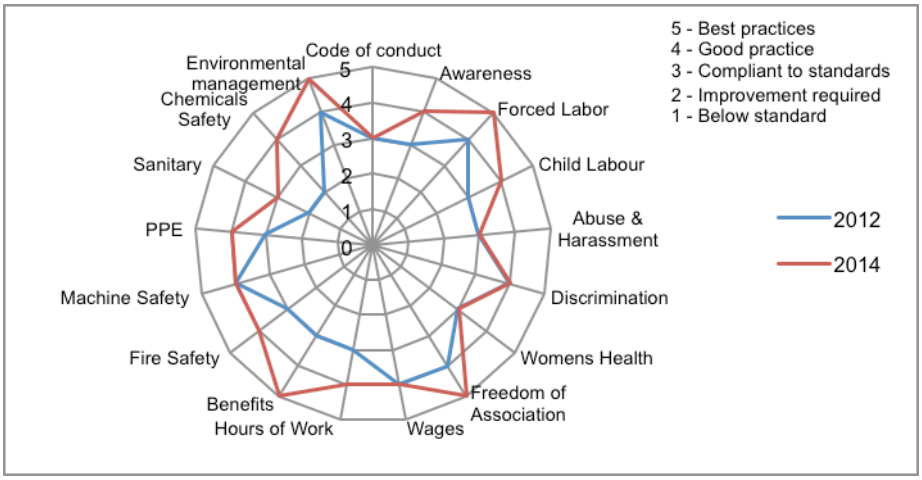

Fig. 6.9: Garment supplier sustainability performance assessment (“Textile A“ – garment supplier). Source: Supplier assessment report (2012 and 2014).

The CSR manager believes that the progress in sustainability performance has been driven mostly by local regulation and pressure from the brands, as captured below:

> *“…the maturity level of the chemical management of the suppliers varies according to the environmental regulation and also the amount of monitoring from government side […] there are some brands that don't start a CSR programme until they have some issue and they would be attacked by NGO's or media. Consequently, a lot of suppliers don’t really have that pressure. They may see if they have a better sustainability performance they have less issues with their customers”.* [CSR manager – European office].

In fact, through their performance assessment programmes, the brands are able to influence sustainability diffusion. The mechanisms’ assessment (e.g. audits), providing feedback and collaborative approaches to design and implement action plans were evidenced at the suppliers’ level (garment and fabric) as being critical factors for implementation of sustainability practices and further improvement in the performance. For example, around four audits per

year are conducted by the brands at “Garment A”’s facilities. The supplier is also engaged to discuss the results of the audits, the compliance level and opportunities of improvement through coaching, meetings, and focus group discussion. The managing director of “Garment A” considers this support beneficial, hence it “show us how to solve the problem”. Similarities were found between “Textile A”’s measures and those of the brands. Overall, the measures are in line with the sustainability practices disseminated across the apparel supply chain by the brands and industrial and apparel organisation standards, such as the ILO, WFSGI, and FLA.

At fabric level, the manager reported a continuous engagement from the leading brand (core customers) to the firm which implements some apparel industry affiliations standards for sustainability performance assessment, such as Sustainable Apparel Coalition (SAC) and Supplier Ethical Data Exchange (Sedex) (Table 6.22). In addition, the brands have used their own sustainability performance programmes, such as audits including labour friendly and environmental friendly materials or specific performance programmes (self-evaluation questionnaires) for carbon, chemical, water or waste reduction (Figure 6.10, p. 128). It is important to note that these distinct performance programmes require a massive effort from the supplier to meet different requests from the brands and audits preparation. Even where common subjects are covered different measures are adopted. This suggests a need of an integration between leading textile brands to design unified sustainability assessment tools. These programmes have more emphasis on environmental sustainability. Indeed, this can be justified by the fact that the major environmental impact occurs at the fabric production level as it was evidenced in the LCA[20] conducted by “Textile A”.

Table 6.22: Supplier sustainability performance assessment programmes (“Textile A“– Fabric supplier).

Performance programme	Description - purpose/focus	Core customers which adhere the programme
Global Social Compliance Program (GSCP)	Continuous improvement of working and environmental conditions in global supply chains.	Adidas, C&A, JC Penney, M&S, Carrefour, Tesco, Wal-Mart, IKEA
Outdoor Industry Association (OIA)	Environmental assessment tool - Eco Index.	REI, New Balance, Patagonia
Sustainable Apparel Coalition (SAC)	Sustainable Apparel Index for environment assessment.	Patagonia, Wal-Mart, Adidas, Levi's, H&M
Better Cotton Initiative (BCI)	Environmental and social measures system for cotton cultivation	Adidas, H&M, Levi's, Nike, Tesco, IKEA
Supplier Ethical Data Exchange (Sedex)	Web-based system with focus on ethical performance across the supply chain	M&S, John Lewis and Adidas

[20] A LCA was conducted in 2012 and 2015 taking as the scope three garments – a T-shirt, a pair of leggings and a packable jacket. The Gabi software and database packages, as well as, data collection at supplier level, were adopted. In terms of environmental impact evaluation, it considered global warming, human toxicity potential, freshwater aquatic eco-toxicity and energy resources, which made up the aggregate impact.

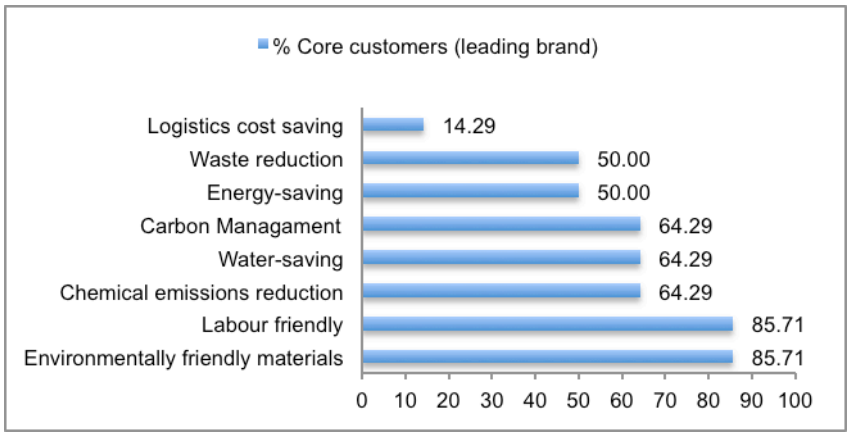

Fig. 6.10: Percentage of the core textile brands (customers of the fabric supplier), which adopt sustainability measures in their performance programmes (e.g. audits and self-evaluation questionnaires) (Fabric supplier). Source: Interview and PowerPoint presentation “sustainability in textile industry shared”.

In terms of the marker efficiency programme, suppliers are requested by the sourcing team to share their marker efficiency. In the production stage, when garment suppliers send some samples, they need to provide their marker efficiency. A target of at least 80% of fabric usage efficiency is established. So, if the target is not met, the sourcing team will engage supplier through awareness meetings, covering an analysis of market efficiency and a review of the fabric cut plan and processes (OF25 and OF31). Interestingly, the product development team has been challenged to consider the marker efficiency in the design process in order to establish achievable goals to the garment suppliers. According to the sourcing manager this programme “gives opportunity to suppliers to think about the use of materials in our products and together act for a more efficient way of producing the garment”.

Besides the fabric cut losses, another source of fabric waste is the huge margin of fabric purchase. “Textile A” requests garment assembly suppliers to buy 20% more fabric. This was based on the production inefficiency and forecast history. The cut losses and leftovers cannot be used by suppliers without “Textile A”’s authorisation. However, there is a restriction on implementing some circular economy alternatives for fabric cut losses and leftovers, particularly in Indonesia. In this country, if the fabric is exported, its leftovers can only be used locally after three years. As a consequence, the manufacturer must store and dispose of it.

Table 6.23 (p. 129) points out the empirical observations concerning the design and implementation of the supplier performance assessment by “Textile A”. Compliance with the sustainability requirements and reduction of fabric waste are the purpose of the performance programme (OF15). Both programmes focus on garment suppliers. The mechanisms assessment (e.g. audits) (OF22), feedback (OF31), and collaborative approaches to design and implement action plans (OF30) were evidenced as influential for diffusion of sustainability practices to improve performance.

Table 6.23: Organisational factors for sustainability diffusion through the supplier performance assessment ("Textile A").

SCM		Organisational factors	Sustainability Practices	
			Environ.	Social
Supplier performance assessment	Design	Definition of performance assessment purpose (OF16)	X	X
		Definition of suppliers to be assessed (OF17)	X	X
		Definition of consistent performance measures (OF18)	X	X
		Sustainability requirements (OF19)	X	X
		Measurement systems implemented (OF20)	NI[1]	NI[1]
		Management systems implemented (OF21)	NI[1]	NI[1]
		Buying firm's sustainability policy and strategy (OF1)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	X	X
		Engagement of external stakeholders (OF6)	NI[1]	NI[1]
		Use of industry code/guideline/principles/initiatives (OF7)	NI[1]	NI[1]
		Collaborative approaches with suppliers (OF30)	NI[1]	NI[1]
	Implementation	Performance mechanisms (OF22)	X	X
		Training purchasing staff on sustainability (OF23)	NI[2]	NI[2]
		Understanding of benefits and risk of sharing information (OF24)	X	X
		Enhanced communication with suppliers (OF25)	X	X
		Strengthened relationship (OF26)	X	X
		Understanding suppliers' capability (OF27)	X	X
		Support of suppliers' top managers (OF28)	X	X
		Supporting and assisting suppliers in the assessment (OF29)	X	X
		Collaborative approaches with suppliers (OF30)	X	X
		Feeding back supplier performance assessment (OF31)	X	X
		Cross-functional integration (OF3)	X	X
		Support of top and middle managers (OF4)	X	X
		Engagement of external stakeholders (OF6)	X	X
		Internal capabilities (OF11)	X	X

[Environ.] Environment

X – Factors identified through empirical evidences

NI – Not identified

NI[1] – OF6, OF7, OF20, OF21 and OF30 - no evidence was found linking these factors with the design of the performance purpose and measures.

NI[2] – OF24 was not found as being influential in the implementation of the performance assessment.

6.5.4 Sustainability diffusion through supplier development

This section is presented considering both the design and the implementation of a supplier sustainability development initiative, which was identified in this last case. The initiative identified focuses on compliance with the sustainability requirements by transferring knowledge, ensuring the products are made under fair, safe and healthy working conditions. Garment suppliers are engaged through regular educating initiatives coordinated by the Global CSR department (OF32, OF33, OF34, OF19 and OF4). Key issues identified in the supplier performance assessment are also taken into consideration to plan the initiative (OF35).

The initiative covers labour and human resources and occupational health and safety. Regarding the labour issues, legal requirements and wages calculation relevant to the country are covered. Chemical management and fire safety are included in occupational health and safety. These subjects are in line with the manufacturing manual (e.g. policy of engagement and chemical management standards), which is also covered during the initiatives. This

training is also conducted by some local NGO's who usually give training regarding health and safety and chemicals in the suppliers' facilities. For example, AFIRM group usually hosts training concerning chemical management. The training occurs at least once per year in the countries where the garment suppliers are located. All suppliers are invited to attend the initiative. "Garment A" attended one of the training sessions promoted by "Textile A". According to the managing director this helps suppliers to know and understand how to meet the requirements.

Table 6.24 presents the organisational factors related to the design and implementation of the transferring knowledge initiative. The annual training initiative focuses on enhancing garment suppliers' knowledge and capability to meet "Textile A"'s sustainability requirements.

Table 6.24: Organisational factors for sustainability diffusion through the supplier development ("Textile A").

SCM		Diffusion factors	Sustainability Practices	
			Environ.	Social
Supplier development	Design	Definition of supplier development purpose (OF32)	X	X
		Definition of development Initiative (OF33)	X	X
		Definition of suppliers to be engaged (OF34)	X	X
		Supplier sustainability performance assessment (OF35)	X	X
		Buying firm's sustainability policy and strategy (OF1)	X	X
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	NI[1]	NI[1]
		Products and/or components characteristics/risk (OF5)	NI[1]	NI[1]
		Internal implementation of sustainability practices (OF8)	NI[1]	NI[1]
		Sustainability requirements (OF19)	X	X
		Collaborative approaches with suppliers (OF30)	NI[1]	NI[1]
	Implementation	Assessment of the impact of the supplier development initiative (OF36)	NI[2]	NI[2]
		Support of top and middle managers (OF3)	X	X
		Cross-functional integration (OF4)	NI[2]	NI[2]
		Internal capabilities (OF11)	X	X
		Training purchasing staff on sustainability issues (OF23)	NI[2]	NI[2]
		Enhanced communication (OF25)	NI[2]	NI[2]
		Strengthened relationship (OF26)	NI[2]	NI[2]
		Understanding suppliers' capability (OF27)	NI[2]	NI[2]
		Support of suppliers' top managers (OF28)	NI[2]	NI[2]
		Collaborative approaches with suppliers (OF30)	NI[2]	NI[2]
		Engagement of external stakeholders (OF6)	***PI***	***PI***

[Environ.] Environment

X – Factors identified through empirical evidences

NI – Not identified

NI[1] – OF4, OF5, OF8 and OF30 were not found as being influential in the design of the transferring knowledge initiative.

NI[2] – OF4, OF23, OF25, OF26, OF27, OF28, OF30 and OF36 were not evidenced in the implementation of the development initiative.

PI – Previously identified

NGOs were engaged to train garment suppliers on sustainability issues.

6.6 SUMMARY OF THE CHAPTER

This chapter presents the analysis of four case studies conducted across leading sustainability manufacturing firms from the beverage, cosmetics and textile sectors. This was based on a series of 30 interviews with directors or

managers of functions which have a strong relationship with suppliers, such as procurement, R&D, sustainability and communication, and a large array of documents (e.g. contracts template, supplier audit reports, sustainability reports).

This chapter has answered partially the RQ1 and provided evidence for the RQ3 and 4. The finding suggests there are a total of 39 organisational factors that affect the diffusion of environmental and social sustainability practices across the supplier base (Figure 6.11, P. 132). 34 of 36 factors identified in the literature were confirmed in the case studies. For instance, product and/or components characteristics/risk (OF5) was not evidenced as being influential in the design of the sustainability requirements in the firms studied. Even the literature showed that the evaluation with suppliers depended on the volume of business (OF14), suppliers in all cases were evaluated against the sustainability requirements regardless of the volume of business before becoming a business partners.

Four factors previously identified in the literature as being influential for a particular supply chain activity (e.g. implementation of supplier performance assessment) were also found in another activity. For example, training purchasing staff on sustainability issues (OF23), found previously as a critical factor for the implementation of the supplier performance programme, was also evidenced in the implementation of the sustainability requirements (supplier selection or renewal). In three of the four companies the supplier evaluation was conducted by the procurement team, which was training to conduct the evaluation and relationship properly.

Three new organisational factors were evidenced in the supplier selection, performance assessment and development, as presented below. The equal importance of sustainability (OF37) in the supplier evaluation compared with other traditional criteria (e.g. quality, cost) was a new organisational factor identified as influential for sustainability diffusion through the supplier selection.

Collaborative approaches with suppliers (OF30) were found to be critical for the joint plans which focused on reducing carbon footprint (Beverage A) and improving packaging (Beverage A, Beverage B and Cosmetics A). Interestingly, in the joint plan for packaging redesign, risk management (OF39) through confidentiality contract, non disclosure agreement or patents were found as a new organisational factor specially in terms of ensuring mutual efforts and capability for the implementation of the initiative.

The following chapter continues to examine the sustainability practices diffused and factors identified based on a cross-case analysis. In addition, the diffusion of innovation theory (Roger, 2003) is employed to analyse how do organisational factors identified affect the diffusion of sustainability practices across the supply chain.

SCM		Organisational Factors	Beverage A		Beverage B		Cosmetic A		Textile A	
			Env	social	Env	social	Env	social	Env	social
Supplier selection	Design	Buying firm's sustainability policy and strategy (OF1)	X	X	X	X	X	X	X	X
		Providing a clear meaning of sustainability (OF2)	X	X	NI	NI	X	X	X	X
		Support of top and middle managers (OF3)	X	X	X	X	X	X	X	X
		Cross-functional integration (OF4)	X	X	X	X	X	X	X	X
		Products and/or components characteristics/risk (OF5)	NI	NI	NI	NI	NI	NI	NI	NI
		Engagement of external stakeholders (OF6)	X	X	NI	NI	NI	NI	NI	NI
		Use of industry code/guideline/principles/initiatives (OF7)	X	X	NI	X	X	X	NI	NI
		Internal implementation of sustainability practices (OF8)	X	X	NI	X	X	X	X	X
		Basis for measuring supplier compliance (OF9)	X	X	X	X	X	X	X	X
		Collaborative approaches with suppliers (OF30)	PI	PI	NI	NI	NI	NI	NI	NI
	Implementation	Clear communication of sustainability requirements (OF10)	X	X	X	X	X	X	X	X
		Supplier evaluation (OF11)	X	X	X	X	X	X	X	X
		Internal capabilities (OF12)	X	X	X	X	X	X	X	X
		Scope for implementation of sustainability requirements (OF13)	X	X	X	X	X	X	X	X
		Volume of business with suppliers (OF14)	NI	NI	NI	NI	NI	NI	NI	NI
		Use of contract (OF15)	X	X	X	X	X	X	X	X
		Support of top and middle managers (OF3)	X	X	X	X	X	X	X	X
		Cross-functional integration (OF4)	X	X	X	NI	X	X	X	X
		Engagement of external stakeholders (OF6)	X	X	X	X	X	X	X	X
		Training purchasing staff on sustainability (OF23)	PI	PI	PI	PI	PI	PI	NI	NI
		The equal importance of sustainability in the evaluation (OF37)	NFI	NFI	NFI	NFI	NFI	NFI	NFI	NFI

SCM		Organisational Factors	Beverage A		Beverage B		Cosmetic A		Textile A	
			Env	social	Env	social	Env	social	Env	social
Supplier development	Design	Definition of supplier development purpose (OF32)	X	X	X	X	X	X	X	X
		Definition of development Initiative (OF33)	X	X	X	X	X	X	X	X
		Definition of suppliers to be engaged (OF34)	X	X	X	X	X	X	X	X
		Supplier sustainability performance assessment (OF35)	X	X	X	X	X	X	X	X
		Buying firm's sustainability policy and strategy (OF1)	X	X	X	X	X	X	X	X
		Support of top and middle managers (OF3)	X	X	X	X	X	X	X	X
		Cross-functional integration (OF4)	X	NI	X	X	X	X	NI	NI
		Products and/or components characteristics/risk (OF5)	X	NI	X	NI	X	NI	NI	NI
		Internal implementation of sustainability practices (OF8)	NI	NI	NI	NI	X	X	NI	NI
		Sustainability requirements (OF19)	X	X	X	X	X	X	X	X
		Collaborative approaches with suppliers (OF30)	X	NI	X	X	X	X	NI	NI
	Implementation	Assessment of the impact of the supplier development initiative (OF36)	X	X	X	X	X	X	NI	NI
		Support of top and middle managers (OF3)	X	X	X	X	X	X	X	X
		Cross-functional integration (OF4)	X	NI	X	X	X	X	NI	NI
		Internal capabilities (OF11)	X	X	X	X	X	X	X	X
		Training purchasing staff on sustainability (OF23)	X	X	X	X	X	X	NI	NI
		Enhanced communication with suppliers (OF25)	X	X	X	X	X	X	NI	NI
		Strengthened relationship (OF26)	X	NI	X	X	X	X	NI	NI
		Understanding suppliers' capability (OF27)	X	NI	X	X	X	X	NI	NI
		Support of suppliers' top managers (OF28)	X	NI	NI	NI	X	X	NI	NI
		Collaborative approaches with suppliers (OF30)	X	X	X	X	X	X	NI	NI
		Engagement of external stakeholders (OF6)	PI	NI	NI	NI	NI	NI	PI	PI
		Risk management of the development intiative (OF39)	NFI	NI	NFI	NI	NFI	NI	NI	NI

SCM		Organisational Factors	Beverage A		Beverage B		Cosmetic A		Textile A	
			Env	social	Env	social	Env	social	Env	social
Supplier performance assessment	Design	Definition of performance assessment purpose (OF16)	X	X	X	X	X	X	X	X
		Definition of suppliers to be assessed (OF17)	X	X	X	X	X	X	X	X
		Definition of consistent performance measures (OF18)	X	X	X	X	X	X	X	X
		Sustainability requirements (OF19)	X	X	X	X	X	X	X	X
		Measurement systems implemented (OF20)	X	NI	NI	NI	NI	NI	NI	NI
		Management systems implemented (OF21)	NI	NI	X	NI	NI	NI	NI	NI
		Buying firm's sustainability policy and strategy (OF1)	X	X	X	X	X	X	X	X
		Support of top and middle managers (OF3)	X	NI	X	X	X	X	X	X
		Cross-functional integration (OF4)	X	NI	X	NI	X	X	X	X
		Engagement of external stakeholders (OF6)	NI	NI	NI	NI	X	X	NI	NI
		Use of industry code/guideline/principles/initiatives (OF7)	X	NI	NI	X	X	X	NI	NI
		Collaborative approaches with suppliers (OF30)	PI	NI	NI	NI	NI	NI	NI	NI
	Implementation	Performance mechanisms (OF22)	X	X	X	X	X	X	X	X
		Training purchasing staff on sustainability (OF23)	X	X	X	X	X	X	NI	NI
		Understanding of benefits and risk of sharing information (OF24)	X	X	X	X	X	X	X	X
		Enhanced communication with suppliers (OF25)	X	X	X	X	X	X	X	X
		Strengthened relationship (OF26)	X	X	X	X	X	X	X	X
		Understanding suppliers' capability (OF27)	X	X	X	X	X	X	X	X
		Support of suppliers' top managers (OF28)	X	X	NI	NI	X	X	X	X
		Supporting and assisting suppliers in the assessment (OF29)	X	X	X	X	X	X	X	X
		Collaborative approaches with suppliers (OF30)	X	X	X	X	X	X	X	X
		Feeding back supplier performance assessment (OF31)	X	X	X	X	X	X	X	X
		Cross-functional integration (OF3)	NI	NI	X	X	X	X	X	X
		Support of top and middle managers (OF4)	X	X	X	X	X	X	X	X
		Engagement of external stakeholders (OF6)	X	X	X	X	X	X	X	X
		Internal capabilities (OF11)	X	X	X	X	X	X	X	X
		Volume of business with suppliers (OF14)	NI	NI	NI	NI	PI	PI	NI	NI
		Review of supplier sustainability performance assessment (OF38)	NI	NI	NFI	NFI	NI	NI	NI	NI

X Identified

NI Not identified

PI Previously identified

NFI New factor identified

Fig. 6.11: Organisational factors evidenced through the case studies.

CHAPTER 7

Cross-case analysis and discussion

7.1 INTRODUCTION

This chapter presents the cross-analysis of the studies presented in Chapter 6. The environmental and social sustainability practices diffused through the supplier selection, performance assessment and development and the organisational factors identified as being influential for diffusion are examined in order to identify the partners and findings that emerge (Section 7.2). The findings are also discussed (Section 7.3). Moreover, the organisational factors are analysed through the lens of the diffusion of innovation theory (Section 7.3). Therefore, this chapter is driven by the research questions below:

(RQ1) How are environmental and social sustainability practices diffused across the supplier base?

(RQ5) How can sustainability diffusion across the supplier base be enhanced (buyer perspective) based on the diffusion of innovation theory?

7.2 CROSS-CASE ANALYSIS

This section presents a cross-case analysis of the sustainability practices and influential factors affecting the diffusion in the supplier selection, performance assessment and development.

7.2.1 Supplier selection

7.2.1.1 Sustainability practices listed in the requirements

Table 7.1 (p. 134) presents 35 sustainability practices which were identified in the requirements of the firms studied. This covers in general environmental management, human rights and working conditions. Chemical management, in terms of the limits of substances in the materials/products supplied and handling, control and compliance with the environmental regulation, was commonly requested for both 1st (e.g. packaging and ingredients processors) and 2nd tier suppliers (e.g. coffee and biodiversity ingredients suppliers and fabrics).

The efficient use of resources, pollution prevention and environmental performance measurement were employed by “Cosmetics A” and “Textile A”. These environmental practices are in general not mandatory according to the environmental regulation. Interestingly, “Cosmetics A” and “Textile A” negotiated the volume and price of the materials (biodiversity ingredients and fabrics) to be processed by the intermediate ingredients processors (“Cosmetics A”) and the garment manufacturers (“Textile A”) and were responsible for paying the price negotiated. Likewise, more productivity and less waste are variables that affect the production cost and consequently the price paid to the

outsourced suppliers. So, the efficient use of resources is a practice expected by the buying firms.

Table 7.1: Sustainability practices listed in the requirements to select suppliers.

Sustainability practices		Beverage A		Beverage B		Cosmetics A		Textile A	
		1st tier	2nd tier	1st tier	2nd tier	1st tier	2nd tier	1st tier	2nd tier
Environmental management	Compliance with environmental regulations	yes	yes	yes	yes	yes	yes	yes	yes
	Environmental authorization (permit)	NE	NE	NE	NE	yes	yes	NE	NE
	Environmental policy	NE	NE	NE	NE	yes	yes	NE	NE
	Environmental aspects assessment	NE	NE	NE	NE	yes	yes	NE	NE
	Water management	NE	yes	NE	NE	yes	yes	NE	NE
	Environmental performance measurement	NE	NE	NE	NE	yes	yes	yes	yes
	Efficient use of resources	NE	NE	NE	NE	yes	yes	yes	yes
	Wastewater treatment system	NE	NE	NE	yes	yes	yes	NE	NE
	Energy management and climate protection	NE	yes	NE	NE	yes	yes	yes	NE
	Waste management	NE	NE	NE	NE	yes	yes	yes	yes
	Pollution minimization	NE	NE	NE	NE	NE	NE	yes	yes
	Air emission inventory	NE	NE	NE	NE	yes	yes	NE	NE
	Chemical management	NE	NE	yes	yes	yes	yes	yes	yes
	Procedure to respond to potential environmental emergency situation	NE	NE	NE	NE	yes	yes	NE	NE
	Conservation of natural habitats and ecosystems	NE	yes	NE	NE	NE	yes	NE	NE
	Soil management	NE	yes	NE	NE	NE	yes	NE	NE
	Crop protection	NE	yes	NE	NE	NE	yes	NE	NE
	Harvest and postharvest handling	NE	yes	NE	NE	NE	yes	NE	NE
	Reproductive material identity, selection and handling	NE	yes	NE	NE	NE	NE	NE	NE
Human rights	Child labour	yes	yes	yes	yes	yes	yes	yes	yes
	Forced labour	yes	yes	yes	yes	yes	yes	yes	yes
	Abuse of labour	yes	yes	yes	yes	yes	yes	yes	yes
	Non-discrimination	yes	yes	yes	yes	yes	yes	yes	yes
	Freedom of association	yes	yes	NE	NE	yes	yes	yes	yes
	Implement social inclusion programme	NE	NE	NE	NE	yes	NE	NE	NE
	Engage suppliers to comply with regulation related to the child labour and forced labour	NE	NE	NE	NE	yes	NE	NE	NE
	Adoption of code of ethics	NE	NE	NE	NE	yes	NE	NE	NE
Working conditions	Compliance with wages and benefits regulation	yes	yes	yes	yes	yes	yes	yes	yes
	Compliance with working hours and overtime regulation	yes	yes	NE	NE	yes	yes	yes	yes
	Compliance with health and safety regulation	NE	NE	NE	NE	yes	yes	yes	yes
	Employee health and safety	yes	yes	yes	yes	yes	yes	yes	yes
	Firefighting system	NE	NE	NE	NE	yes	yes	yes	yes
	Procedure to identify risk	NE	NE	NE	NE	yes	yes	yes	yes
	Use of personal protection equipment	NE	NE	NE	NE	yes	yes	yes	yes
	Training employees	NE	NE	NE	NE	yes	yes	yes	yes

NE – not employed
Based on Table 6.2, Section 6.3.2.1, tables 6.8, 6.12 and 6.19.

In terms of social practices, human rights (e.g. child labour, forced labour, abuse and non-discrimination) and working conditions (e.g. employee health and safety and wages and benefits in line with local regulation) were generally requested for both suppliers located in both the 1st and 2nd tier. “Cosmetics A” and “Textile A” also employed requirements regarding health and safety management (e.g. training employees, employment of procedure to identify risk). Interestingly, suppliers in the 1st tier (i.e. industrial – e.g. materials,

packaging and outsourced suppliers) of “Cosmetics A” were also challenged to engage their suppliers to comply with regulations related to forced labour and child labour.

7.2.1.2 Design of the sustainability requirements

The information presented in Tables 4.1 and 4.2 in Chapter 4 and Tables 6.3, 6.7, 6.13 and 6.20 in Chapter 6 was further analysed and synthesised to understand the influential organisational factors, in both environmental and social sustainability practices, in the design of the requirements and diffusion of the practices through the supplier selection. The results are shown in Figure 7.1. To support the discussion, details of how the factors were supported in the literature are also presented, including the number of citations and the empirical rigour (i.e. methodology employed, e.g. conceptual/literature review or case studies and surveys).

Chapter 4
Tables 4.1 & 4.2

Chapter 6
Tables 6.3, 6.7, 6.13 & 6.20

Organisational Factors	Number of citations	Influential for diffusion		Empirical rigour		Beverage A		Beverage B		Cosmetic A		Textile A	
		Env	social	Empirical	Conceptual / Review	Env	social	Env	social	Env	social	Env	social
Buying firm's sustainability policy and strategy (OF1)	**14**	X	X	Both	Both	X	X	X	X	X	X	X	X
Providing a clear meaning of sustainability (OF2)	6	X	X	Both	Both	X	X	NI	NI	X	X	X	X
Support of top and middle managers (OF3)	8	X	X	Both	Both	X	X	X	X	X	X	X	X
Cross-functional integration (OF4)	7	X	X	Env	Both	X	X	X	X	X	X	X	X
Engagement of external stakeholders (OF6)	2	X	X	Soc	Soc	X	X	NI	NI	NI	NI	NI	NI
Use of industry code/guideline/principles/initiatives (OF7)	3	X	X	Soc	Both	X	X	NI	X	X	X	NI	NI
Internal implementation of sustainability practices (OF8)	6	X	X	Both	Both	X	X	NI	X	X	X	X	X
Basis for measuring supplier compliance (OF9)	4	X	X	Both	Both	X	X	X	X	X	X	X	X
Collaborative approaches with suppliers (OF30)	-	-	-	-	-	PI	PI	NI	NI	NI	NI	NI	NI
Clear communication of sustainability requirements (OF10)	26	X	X	Both	Both	X	X	X	X	X	X	X	X
Supplier evaluation (OF11)	39	X	X	Both	Both	X	X	X	X	X	X	X	X
Internal capabilities (OF12)	5	X	X	Both	Both	X	X	X	X	X	X	X	X
Scope for implementation of sustainability requirements (OF13)	4	X	X	Both	Both	X	X	X	X	X	X	X	X
Use of contract (OF15)	9	X	X	Both	Both	X	X	X	X	X	X	X	X
Support of top and middle managers (OF3)	7	X	X	Both	Env	X	X	X	X	X	X	X	X
Cross-functional integration (OF4)	4	X	X	Env	Both	X	X	X	NI	X	X	X	X
Engagement of external stakeholders (OF6)	10	X	X	Both	Both	X	X	X	X	X	X	X	X
Training purchasing staff on sustainability (OF23)	-	-	-	-	-	PI	PI	PI	PI	PI	PI	NI	NI
The equal importance of sustainability in the evaluation (OF37)	-	-	-	-	-	NFI	NFI	NFI	NFI	NFI	NFI	NFI	NFI

[Env-Environment, X-Identified, NI-Not identified, PI-Previously identified and NFI-New factor identified]

Fig. 7.1: Organisational factors for diffusion of environmental and social sustainability practices through the supplier selection.

The organisational factors buying firm's sustainability policy and strategy (OF1), internal implementation of sustainability practices (OF7) and use of international standards (OF21) were also evidenced as being influential for designing the sustainability requirements. Table 7.2 (p. 136) highlights the strategies/policies, internal sustainability practices implemented and standards, which were influential in the design of the requirements.

The support of top and middle managers (OF3) and cross-functional integration (OF4) were evidenced as being critical factors for designing the sustainability requirements, by addressing the expertise of the internal functions

involved in sustainability and supply chain management. The engagement of external stakeholders (OF6) and collaborative approaches with suppliers (OF30) were evidenced in "Beverage A"'s case. A brand team, an NGO, sugar processors and growers' representatives were engaged to jointly design the requirements for the sugar growers (2nd tier) considering the best sustainable agricultural practices.

Table 7.2: Organisational factors for considering both environmental and social sustainability practices in the design of the requirements.

Design of requirements	Beverage A	Beverage B	Cosmetics A	Textile A
Sustainability Requirements adopted by the firms studied	General sustainability requirements and sustainable agriculture requirements	There is no specific document adopted. However, sustainability practices are considered in the contract.	Supplier code of conduct and guideline manuals and Policy of sustainable use of biodiversity ingredients	Supplier policy of engagement, chemical management standards & material management guidelines
Policy / strategies (OF1)	2020 Sustainability plan (commitments & priorities)	Firm's code of ethics (sustainability principles) & responsible supply chain certification	2050 Sustainability vision (commitments & priorities)	Global code of conduct & CSR policy (sustainability principles and values)
Use of industry code (OF7)	AIM-Progress Forum	ILO standards and global compact principles	UEBT standards	ILO standards, WFSGI sustainability standards, FLA standards and REACH standards.
Internal implementation of sustainability practices (OF8)	Energy efficiency programme, health and safety standards	Social responsibility practices - human rights, labour standards & anti-corruption	Environmental and social corporate management systems	Not evidenced.

Based on Section 6.2.2.1 and Table 6.3, Section 6.3.2.1 and Table 6.7, Section 6.4.2.1 and Table 6.13, and Section 6.5.2.1 and Table 6.20.

7.2.1.3 Implementation of the sustainability requirements

The firms studied usually communicate their requirements by sharing hard copy and/or using web (e.g. supplier portal). The engagement of stakeholders (OF6) was also evidenced. For instance, in "Textile A"'s case, a local office, which is a third party firm located in the same country where garment suppliers operate, was engaged to communicate the manufacturing manual for the garment suppliers and to monitor its implementation. This engagement also facilitated barriers in terms of language and cultural aspects to be overcome. This adds empirical evidence to similar arguments made by Elg and Hultman (2011), who found that the establishment of local trading offices helped to manage social practices within supplier relationship. The difference was the fact that the firms established the office with their own team.

The engagement of stakeholders was also found in the implementation of requirements in "Beverage A"'s case, but in a different context. Together with other FMCG manufacturers, ingredients processors and the SAI platform, the firm worked to design a sustainable agricultural self-evaluation tool for sugar growers, which considered a set of common sustainability practices used in the

requirements of FMCG firms, in order to ensure that growers meet the requirements. It is important to emphasise that OF6 was previously identified in the literature as being influential in the design of the sustainability requirements and supplier sustainability performance assessment programme, however it has not been evidenced in the literature as being critical for implementing the sustainability requirements (communication of requirements and supplier evaluation).

The use of contracts (OF15) with specific sustainability clauses was confirmed in all cases as a mechanism to enforce the implementation of the expected sustainability practices listed in the requirements. The factors internal capability (OF11), the support of top and middle managers (OF3) and cross-functional integration (OF4) (e.g. quality and procurement – Beverage B, R&D and procurement – Cosmetics A, and CSR and procurement – Textile A) were evidenced as being influential for the supplier selection process, especially the supplier evaluation.

Training purchasing staff on sustainability (OF23) is a previously identified factor evidenced in the implementation of the sustainability requirements. Suppliers were evaluated by the procurement team which was trained to carry out the sustainability evaluation ("Beverage A" and "Beverage B"). In "Cosmetics A"'s case, the procurement team conducted an initial sustainability evaluation for the supplier qualification phase, but the final evaluation, based on audits was conducted by the quality department. Both teams were trained to perform the evaluation. "Textile A"'s CSR team was responsible for the evaluation and this factor was therefore not evidenced.

It was also evident in all cases that sustainability was equally important as other traditional evaluation dimensions in the supplier evaluation, such as cost, quality and delivery (OF37). This is a novel factor generated from rich empirical data, which has not been offered in the current literature. Interestingly, it persuades suppliers to implement sustainability practices in order to comply with the selected requirements and achieve a positive score in the evaluation.

In terms of the scope of implementation (OF13), "Beverage B", "Cosmetics A" and "Textile A" addressed both 1st tier and 2nd tier suppliers (Table 7.3, p. 138). Interestingly, all industrial suppliers located in the first tier (e.g. packaging, materials and outsourced suppliers) regardless of the volume of business were evaluated using self-evaluation questionnaires and 2nd and/or 3rd party audits, which considered sustainability as being equally important as the traditional dimensions (e.g. cost, quality, delivery).

Critical material suppliers located in the 2nd tier, such as ingredients suppliers (i.e. coffee beans - "Beverage A" and biodiversity ingredients - "Cosmetics B"), were also evaluated but only through 2nd party audits conducted by the team devoted to the supplier category. Fabric suppliers, which are also critical in terms of environmental risk (e.g. chemical), were evaluated by the "Textile A"'s global CSR team. By using contracts, in "Beverage A"'s case, the sugar processors were responsible for ensuring that the growers comply with the requirements. It is important to note that sugar processors are in general large firms characterised by complex processes in terms of technologies, investment and environmental impact and are located close to the sugar growers (Renouf

et al., 2008; Walter et al., 2011; British Sugar[21]). This might impact the configuration of the supply chain in terms of the major responsibility of the sugar processor for diffusion of sustainability practices to the sugar growers. This work therefore presents distinctions of tiers absent in the literature. This work is the first instance of considering types of suppliers and how suppliers are evaluate according to their location in the tiers.

Table 7.3: Organisational factors for the implementation of the sustainability requirements.

Implementation of requirements	Beverage A	Beverage B	Cosmetics A	Textile A
Scope of implementation (OF13)	All industrial suppliers (IS) evaluated. - 1st tier suppliers	All suppliers evaluated. - 1st tier – IS, e.g. packaging & materials suppliers - 2nd tier – Coffee growers (CG)	All suppliers evaluated. 1st tier – IS – outsourced packaging and materials suppliers 2nd tier – biodiversity ingredients suppliers (BIS)	All garment manufacturers (1st tier) evaluated by regional (European Apparel office). Fabric suppliers (2nd tier) are evaluated by the global HQ (Japan).
Supplier evaluation (OF11)	Self-evaluation & 3rd party audit	2nd party audit (CG) & 3rd party audit (IS)	Self-evaluation (IS) & 2nd party audit (IS & BIS)	2nd party audit
Use of contracts with sustainability clauses (OF15)	IS	CG & IS	IS & BIS	Garment and fabric suppliers

IS – Industrial suppliers / CF – coffee growers / BIS – Biodiversity ingredients suppliers
Based on Section 6.2.2.1 and Table 6.3, Section 6.3.2.1 and Table 6.7, Section 6.4.2.1 and Table 6.14, and Section 6.5.2.1 and Table 6.21.

Based on the findings (Tables 7.1, 7.2 and 7.3 and Figure 7.1), a more comprehensive view of how environmental and social sustainability practices are considered in the supplier selection (i.e. design of requirements and implementation) is presented in Figure 7.2 (p. 139). This integrates the organisational factors evidenced in the design and implementation of the sustainability requirements.

For instance, OF1, OF3, OF4, OF6, OF7, OF8 and OF30 influence the design of the sustainability requirements, considering both environmental and social practices. OF2 and OF9 emphasise the sustainability practices prioritised by the buyers. Then, the flows of communication (OF9), supplier evaluation (OF11) and formalisation (OF15) were confirmed as being critical for the implementation of the requirements. Interestingly, the factors OF3, OF4, OF6, OF11, OF13, OF23 and OF37 leveraged the suppliers' sustainability evaluation.

[21] http://www.britishsugar.co.uk/

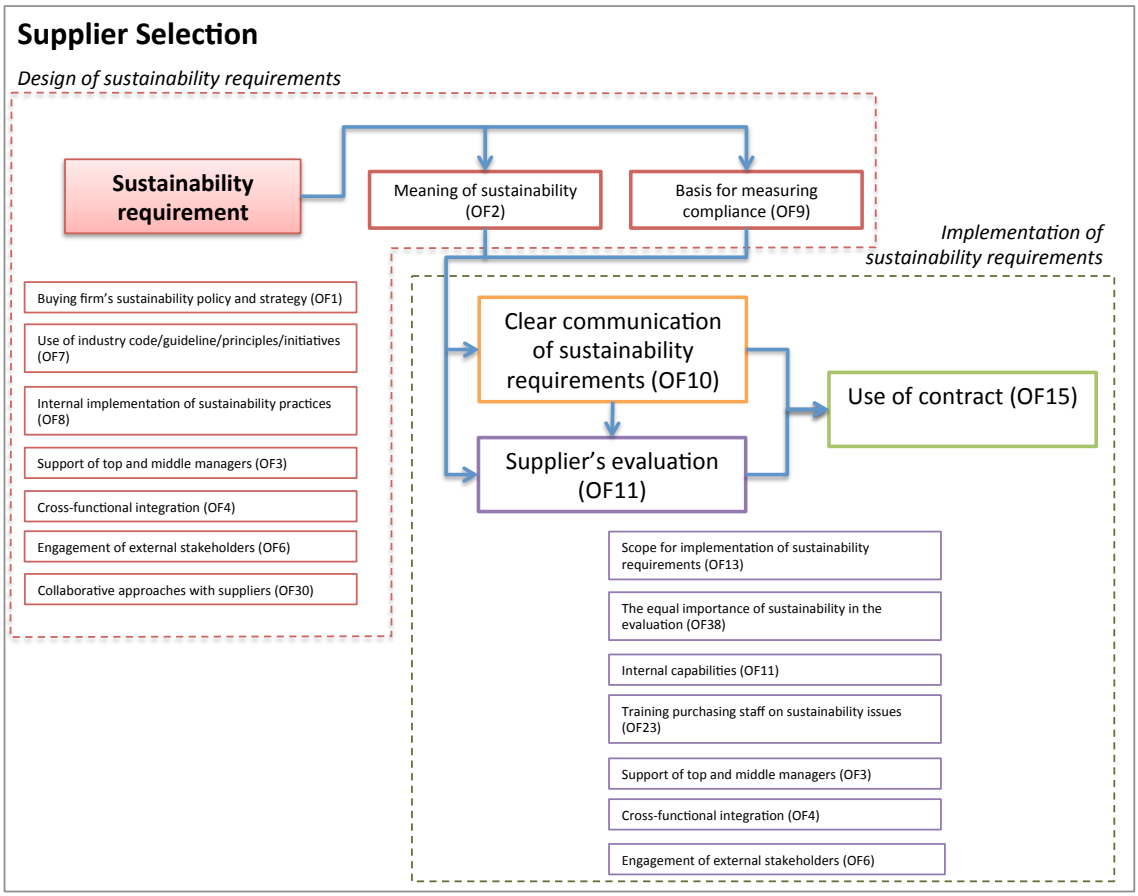

Fig. 7.2: Framework of organisational factors affecting the diffusion of environmental and social sustainability practices through the supplier selection.

7.2.2 Supplier performance assessment

7.2.2.1 Sustainability practices diffused through the performance assessment

Compliance with environmental, human rights and health and safety regulations, working conditions, chemical management and investments in society were sustainability practices commonly monitored and assessed by the firms studied across 1st and 2nd tiers (Table 7.4). With the exception of the investment in society, those common practices monitored are compulsory and can be associated to the risk management.

Compliance with the requirements and regulation were monitored through using a third party sustainability database (Ecovadis) in "Beverage A"'s case. This database has a standardised protocol to assess suppliers that can be adapted according to the buyers' needs (requirements) (Appendix E). However, it was not possible to access an example of "Beverage A"'s supplier report to analyse the sustainability practices monitored. On the other hand, "Beverage A" has a carbon programme focused on measuring and reducing carbon emissions of key suppliers, which were evidenced during the interviews and analysis of documents. Table 7.4 (p. 140) presents the sustainability practices evidenced in the cases.

Table 7.4: Sustainability practices measured in the supplier performance assessment.

Sustainability practices		Beverage A		Beverage B		Cosmetics A		Textile A	
		1st tier	2nd tier	1st tier	2nd tier	1st tier	2nd tier	1st tier	2nd tier
Environmental management	Compliance with regulation	-	-	yes	yes	yes	yes	yes	yes
	Environmental authorisation	-	-	NE	NE	yes	yes	yes	yes
	Compliance with requirements	-	-	yes	yes	yes	yes	yes	yes
	EMS / Certification	-	-	NE	NE	yes	NE	NE	yes
	Identification of significant environmental aspects	-	-	yes	NE	yes	NE	NE	NE
	Procedures for environmental control	-	-	yes	NE	yes	NE	NE	NE
	Internal function for environmental management	-	-	yes	NE	NE	NE	NE	NE
	Water management *	-	-	NE	yes	yes	NE	NE	NE
	Efficiency of material usage	-	-	NE	NE	yes	yes	yes	NE
	Energy management*	yes	NE	NE	NE	yes	NE	NE	NE
	Use of recycled materials	-	-	NE	NE	yes	NE	NE	NE
	Wastewater treatment **	-	-	NE	yes	yes	yes	NE	NE
	Waste management ***	-	-	NE	NE	yes	yes	NE	NE
	Carbon Management ****	yes	NE	NE	NE	yes	yes	NE	NE
	Chemical management	-	-	yes	yes	yes	yes	yes	yes
	Fire safety *****	-	-	NE	NE	yes	yes	yes	yes
	Good manufacturing practices	-	-	NE	yes	yes	yes	NE	NE
	Sustainable agriculture practices	-	-	NE	yes	NE	yes	NE	NE
	Soil management	-	-	NE	yes	NE	yes	NE	NE
	Average temperature rainfall	-	-	NE	yes	NE	NE	NE	NE
	Integrated agriculture	-	-	NE	yes	NE	NE	NE	NE
	Fertilization	-	-	NE	yes	NE	NE	NE	NE
	Use of pesticides and chemicals	-	-	NE	yes	NE	NE	NE	NE
	Natural reserves and protection of endemic species	-	-	NE	yes	NE	yes	NE	NE
	Biodiversity conservation	-	-	NE	yes	NE	yes	NE	NE
Human rights	Compliance with requirements	-	-	NE	NE	yes	yes	yes	yes
	Compliance with the labour regulation	-	-	yes	yes	yes	yes	yes	yes
	Certifications	-	-	yes	yes	yes	NE	yes	yes
	Human rights	-	-	NE	yes	yes	yes	yes	yes
	Investment in society (health, education, environment)	-	-	yes	yes	yes	yes	yes	yes
	Code of conduct	-	-	NE	NE	yes	NE	yes	NE
Working conditions	Compliance with regulation	-	-	yes	yes	yes	yes	yes	yes
	Working and labour conditions	-	-	yes	yes	yes	yes	yes	yes
	Wages	-	-	NE	yes	NE	yes	yes	NE
	Cost Analysis	-	-	NE	yes	yes	yes	yes	NE
	Workers competencies	-	-	NE	yes	NE	NE	NE	NE
	Investments in formal education and training for employees	-	-	NE	NE	yes	NE	NE	NE
	Inclusion of disable employees in the workplace	-	-	NE	NE	yes	NE	NE	NE
	Apprenticeship	-	-	NE	NE	yes	NE	NE	NE
	Labour relationship – families & cooperatives/association	-	-	NE	NE	NE	yes	NE	NE
	Public health facility	-	-	NE	yes	NE	NE	NE	NE
	Heath and safety conditions	-	-	NE	yes	yes	yes	yes	yes
	Rate of incidents (H&S)	-	-	NE	yes	yes	yes	yes	yes
	Risk of accidents or injures	-	-	NE	yes	NE	NE	NE	NE
	Machinery safety	-	-	NE	yes	NE	NE	yes	yes
	PPE	-	-	NE	NE	NE	NE	yes	NE
	Sanitary facilities, comfort and hygiene	-	-	NE	NE	NE	NE	yes	NE

NE – not employed
[-] Not evidenced
Based on Section 6.2.3.1, tables 6.8, 6.9, 6.15 and 6.22.

* source, volume and quality
** technology employed, volume
*** volume, treatment & final disposal)

**** carbon emission measurement and plans for reduction
***** equipment, evacuation routes, training, firefighting procedures

Common practices were also identified in the 2nd tier related to sustainable agriculture, such as soil management and conservation of biodiversity (Beverage A and Cosmetics A). Wages calculation, fire safety and wastewater treatment were also observed in the 2nd tier.

Specific performance programmes based on individual measures were also evidenced in “Beverage B” and “Textile A”. In the first case, the programme focused on environmental management through the existence of a function and procedures to control environmental aspects. “Textile A” introduced a marker efficiency programme to garment suppliers in order to assess the efficiency of fabric usage.

Although not listed in the requirements, some sustainability practices were monitored, such as the existence of environmental and social management system certifications (ISO 14001, SA8000) (“Beverage B”, “Cosmetics A” and “Textile A”), investment in society and formal education of employee (“Beverage A” and “Cosmetics A”), use of recycled materials (“Cosmetics A”), carbon management (“Beverage A”) and environmental management practices (“Beverage B”). It is important to note that these practices are not compulsory according to the environmental regulation. Most of these practices were considered in the sustainability policy and strategies of the firms.

By contrast, a few sustainability practices listed in the requirements (three of 38 sustainability practices) were not monitored, such as waste management and energy management (“Textile A”) and the engagement with suppliers to comply with the regulation related to child labour and forced labour (“Cosmetics A”). It is difficult to explain this finding but it might be related to the lack of significant risk to the buyers. For example, waste management is addressed in the contract with the supplier and is a compulsory practice, i.e. the garment suppliers need to demonstrate compliance with the regulation to the local environmental agency. Regarding the engagement of suppliers on human rights issues, which could induce the diffusion of human rights across different tiers, were any problem to occur in the 2nd tier or at the top of the supplier base, the 1st tier suppliers would receive most of the pressure and the buyer could defend itself based on the fact that the requirements and guidelines were communicated and the contract addressed this issues.

7.2.2.2 Design of supplier performance assessment

Figure 7.3 (p. 142) presents the organisational factors which influence the design and implementation of the supplier performance assessment. It was apparent that the organisational factors – support of top and middle managers (OF3), cross-functional integration (OF4) and use of industry code/guideline (OF7) impacted the inclusion of both environmental and social sustainability practices to be measured in the performance assessment. Managers from quality, procurement and sustainability departments were mostly involved. In addition, the factor engagement of stakeholders (OF6) was supported by empirical evidence as being influential for designing both environmental and social measures. In the “Cosmetic A”’s case, the support of a consultancy firm was also critical in the design of the performance programme (OF6). This extends previous researches which were based on conceptual models and

literature review papers (e.g. Hervani et al., 2005; Schaltegger and Burritt, 2014; Shaw et al., 2010).

Additionally, collaborative approaches with key suppliers representatives to design carbon performance programme was evidenced in “Beverage A”’s case. This was a previous factor identified in the literature but not influential for the design of performance measures.

Chapter 4
Tables 4.3 & 4.4

Chapter 6
Tables 6.4, 6.9, 6.15 & 6.23

SCM		OF	Organisational Factors	Number of citations	Influential for diffusion		Empirical rigour		Beverage A		Beverage B		Cosmetic A		Textile A	
					Env	social	Empirical	Conceptual / Review	Env	social	Env	social	Env	social	Env	social
Supplier performance assessment	Design	16	Definition of performance assessment purpose (OF16)	2	X	X	both	both	X	X	X	X	X	X	X	X
		17	Definition of suppliers to be assessed (OF17)	4	X	X	both	both	X	X	X	X	X	X	X	X
		18	Definition of consistent performance measures (OF18)	11	X	X	both	both	X	X	X	X	X	X	X	X
		19	Sustainability requirements (OF19)	5	X	X	both	both	X	X	X	X	X	X	X	X
		20	Measurement systems implemented (OF20)	7	X	X	both	both	X	NI	NI	NI	NI	NI	NI	NI
		21	Management systems implemented (OF21)	13	X	X	both	both	NI	NI	X	NI	NI	NI	NI	NI
		1	Buying firm’s sustainability policy and strategy (OF1)	5	X	X	-	both	X	X	X	X	X	X	X	X
		3	Support of top and middle managers (OF3)	1	X	-	-	Env	X	NI	X	X	X	X	X	X
		4	Cross-functional integration (OF4)	2	X	-	-	Env	X	NI	X	NI	X	X	X	X
		6	Engagement of external stakeholders (OF6)	9	X	X	Soc	both	NI	NI	NI	NI	X	X	NI	NI
		7	Use of industry code/guideline/principles/initiatives (OF7)	6	X	X	Soc	Both	X	NI	NI	X	X	X	NI	NI
		30	Collaborative approaches with suppliers (OF30)	-	-	-	-	-	PI	NI	NI	NI	NI	NI	NI	NI
	Implementation	22	Performance mechanisms (OF22)	15	X	X	Both	Both	X	X	X	X	X	X	X	X
		23	Training purchasing staff on sustainability (OF23)	8	X	X	Both	Both	X	X	X	X	X	X	NI	NI
		24	Understanding of benefits and risk of sharing information (OF24)	2	X	X	Env	Both	X	X	X	X	X	X	X	X
		25	Enhanced communication with suppliers (OF25)	21	X	X	Both	Both	X	X	X	X	X	X	X	X
		26	Strengthened relationship (OF26)	6	X	X	Both	Both	X	X	X	X	X	X	X	X
		27	Understanding suppliers’ capability (OF27)	4	X	-	Env	Env	X	X	X	X	X	X	X	X
		28	Support of suppliers’ top managers (OF28)	1	X	-	Env	-	X	X	NI	NI	X	X	X	X
		29	Supporting and assisting suppliers in the assessment (OF29)	3	X	X	Both	-	X	X	X	X	X	X	X	X
		30	Collaborative approaches with suppliers (OF30)	18	X	X	Both	Both	X	X	X	X	X	X	X	X
		31	Feeding back supplier performance assessment (OF31)	20	X	X	Both	Both	X	X	X	X	X	X	X	X
		3	Cross-functional integration (OF3)	3	X	X	Env	Both	NI	NI	X	X	X	X	X	X
		4	Support of top and middle managers (OF4)	3	X	X	Env	Both	X	X	X	X	X	X	X	X
		6	Engagement of external stakeholders (OF6)	17	X	X	Both	Both	X	X	X	X	X	X	X	X
		11	Internal capabilities (OF12)	8	X	X	Both	Both	X	X	X	X	X	X	X	X
		14	Volume of business with suppliers (OF14)	-	-	-	-	-	NI	NI	NI	NI	PI	PI	NI	NI
		38	Review of supplier sustainability performance assessment (OF38)	-	-	-	-	-	NI	NI	NFI	NFI	NI	NI	NI	NI

Env-Environment, X-Identified, NI-Not identified, PI-Previously identified and NFI-New factor identified]

Fig. 7.3: Organisational factors for diffusion of environmental and social sustainability practices through the supplier performance assessment.

The supplier sustainability performance assessment in the firms studied mostly focused on compliance with the requirements and regulation, as well as, improvements in individual sustainability measures or set of sustainability measures, which included both environmental and social practices. The sustainability practices listed in the requirements (OF19) were commonly considered in the design of measures. Furthermore, the use of industry code/guidelines/principles/initiatives (OF7) was evidenced, such as WRI/WBCSD GHG protocol, ILO, UEBT, WFSGI and ISO 14001. The sustainability policy and strategy (OF1) was also considered in the design of performance measures in “Beverage A”, “Beverage B” and “Cosmetics A” (Table 7.5, p. 143).

Table 7.5: Organisational factors for designing supplier sustainability performance assessment.

Design and implementation of performance programmes	Beverage A	Beverage B	Cosmetics A	Textile A
Purpose (OF16)	Compliance with requirements & improvement in carbon programme	Compliance with requirements & improvement in sustainability performance assessment (SPA)	Compliance with requirements & improvement in SPA	Compliance with requirements & improvement in marker efficiency
Policy / strategies (OF1)	2020 Sustainability plan	Responsible supply chain certification	2050 Sustainability vision	Not evidenced
Use of industry code (OF7)	WRI/WBCSD GHG protocol (carbon challenge)	ILO	UEBT	ILO standards & WFSGI sustainability standards
Requirements (OF19)	Yes	Yes	Yes	Yes
Suppliers to be assessed (OF17) & Performance mechanisms (OF22)*	***Key IS suppliers*** (based on spending and carbon risk) - Compliance: Ecovadis & 3rd party audits. - Carbon programme - lead by procurement team – self-evaluation	***All IS*** - Environmental programme – self-evaluation lead by quality team. ***Key IS*** (based on spending) - Compliance: 3rd party audit. ***All CG*** Sustainability programme conducted by coffee procurement team	***All IS*** - Compliance – 2nd party audits carried out by the quality team - SPA – Self-evaluation lead by procurement team ***All BIS*** - Compliance & SPP – 2nd party audits carried out by BIS relationship team	***All Garment suppliers*** - Compliance - 2nd party audits carried out by CSR team - Marker efficiency: self-evaluation lead by Sourcing team. ***All Fabric suppliers*** - Compliance: 2nd party audits carried out by Global CSR team (in early stage)

IS – Industrial suppliers / CF – Coffee growers / BIS – Biodiversity ingredients suppliers / SSA – sustainability performance assessment
*** Organisational factor related to the implementation of performance assessment**
Based on Section 6.2.3.1, tables 6.4, 6.9, 6.14, 6.15, 6.16, 6.21 and 6.23.

The performance programme adopted by the firms studied focused on suppliers in the 1st tier (e.g. packaging, outsourced suppliers and ingredients processors) and critical ingredients and material suppliers located in the 2nd tier (e.g. coffee, biodiversity ingredients and fabrics). While "Beverage A and B"'s key industrial suppliers were assessed in terms of compliance through third party audits, "Cosmetics A" and "Textile A" employed 2nd party audits for all industrial suppliers. All industrial suppliers were also covered through self-evaluation programmes focused on environmental management ("Beverage A") and sustainability management (including both environmental and social practices) ("Cosmetics A").

"Textile A" also addressed a specific programme for the efficiency of fabric usage to all garment suppliers (1st tier). The efficiency of material usage was also monitored by "Cosmetics A" through a self-evaluation programme, which covered more measures. General sustainability performance programmes were found for the critical ingredients and material suppliers in the 2nd tier. Coffee and biodiversity ingredients' suppliers were monitored through 2nd party audits by dedicated teams in "Beverage A" and "Cosmetics A". Not only compulsory measures in terms of compliance with regulation or requirements were adopted, but also measures associated with risk and feasibility of the suppliers' activities,

such as biodiversity conservation, sustainable agriculture practices, wages calculation and production cost.

7.2.2.3 Implementation of supplier performance assessment

All organisational factors were confirmed in the implementation of supplier sustainability performance assessment. Understanding suppliers' capability (OF27) and the support their top manager (OF28) were evidenced as being influential for both environmental and social sustainability performance. Interestingly, only empirical papers on supplier environmental performance assessment have supported these factors (e.g. Dou et al., 2014a; Hajmohammad et al., 2013; Shaw et al., 2010).

It was evidenced that the performance programmes with focus on compliance were compulsory and the payment of the audit cost varied. For instance, "Beverage B" and "Textile A" paid costs, whereas suppliers were responsible for paying the "Beverage A" and "Cosmetics A"'s cases (OF24). The 2nd party audits conducted by "Beverage B", "Cosmetic A" and "Textile A" across the 2nd tier suppliers (i.e. coffee growers and biodiversity ingredient suppliers, respectively) were also compulsory, but the firms incurred the costs of assessment. Training purchasing staff on sustainability (OF23) was also critical for running the performance assessment.

Particularly in "Beverage A"'s case, an independent database (Ecovadis) was adopted to annually monitor the key suppliers' compliance (i.e. requirements and regulation) (OF6). The results of Ecovadis were shared with "Beverage A" and were taken into consideration in the final supplier performance score, which also included the results of the carbon programme. This helps the firm to identify potential areas for improvements. This can also be used as a benchmark tool to compare suppliers within the same purchasing group. Depending on the membership to which buyers and suppliers adhered, different buyers can access the full supplier assessment report, which might reduce the audit fatigue to suppliers. Similar databases were mentioned in few review papers without providing empirical evidence. For instance, Sedex (Empowering sustainable and ethical supply chain), which focused on social sustainability practices, was mentioned by Kogg and Mont (2012) and Higg Index (mostly adopted in the apparel and textile sector – focused more on environmental sustainability practices) by Beske-Janssen et al. (2015).

The engagement of third party audit firms to assess suppliers was also identified. This was commonly employed to monitor the key industrial suppliers' compliance with the requirements in "Beverage A"'s case, while in "Cosmetics A" and "Textile A" this mechanism was adopted when the department responsible for monitoring the industrial suppliers (2nd party audits) had high demand of audits. In terms of the 2nd tier suppliers, it was apparent that there were only 2nd party audits for green coffee, biodiversity ingredients and fabrics, covering a set of measures that go beyond compulsory sustainability practices. This slightly contrasts the research carried out by Grimm et al. (2016), who found that 2nd and 3rd party audits had a similar effect on sub-suppliers' compliance with the requirements in the IT and retail sector. Perhaps, the amount of sub-suppliers justified the use and impact of both mechanisms.

To date, little evidence has been presented in circumstances when stakeholders are engaged in the relationship with 1st tier suppliers and lower-tier

suppliers (e.g. Tachizawa and Wong, 2014). This study presents evidence where consultancy firms, third party audit or NGO were engaged to design performance measures and assess supplier performance.

The review of the performance assessment measures (OF38) is a new organisational factor and has not been covered in the literature. “Beverage B” constantly reviewed the performance measures in order to identify inappropriate measurement and employ realistic measures according to the specificities of the regions where the coffee growers were located (e.g. Brazil, India, Ethiopia). It is important to emphasise that the performance assessment can induce suppliers to implement practices to meet compliance level and achieve significant progress. For that, it is crucial to implement and review the performance measures in order to adopted feasible and realistic measures. To date, the literature simply analyses how to measure performance, such as Hervani et al. (2005) and Shaw et al. (2010).

A previous identified factor was also evidenced in “Cosmetics A”’s case. The volume of business with supplier (OF14) was evidenced as being a critical organisational factor for implementing supplier sustainability performance. When industrial suppliers lost a volume of orders from “Cosmetics A” their commitment to answer the self-evaluation programme also reduced. Interestingly, this factor was identified by (Grimm et al., 2014) as a perceived value for suppliers to meet the sustainability requirement, but was not evidenced in the case studies conducted in this research.

Based on the findings from rich empirical data collected in the case studies (Figure 7.3 and Table 7.5), Figure 7.4 (p. 146) presents an overview of the organisational factors influencing the diffusion of sustainability practices through the supplier performance assessment. It should be noted that in the design of purpose (OF16), definition of consistent measures (OF18) and suppliers to be assessed (OF17) all cases were confirmed as being critical in the design of performance programmes, adding empirical evidences to the literature. These factors were influenced by OF1, OF3, OF4, OF6, OF7, OF19, OF20, OF21 and OF30. In general, the performance assessment focused on compliance with the requirements and improvements in individual environmental measures (e.g. carbon and resource efficiency).

The employment of 2nd and 3rd party audits to gather data and assess suppliers (OF22 – performance mechanisms) were mostly adopted by the firms studied. Particularly for critical materials in the 2nd tier only 2nd party audits conducted by devoted teams for materials supplied (e.g. green coffee beans and biodiversity ingredients) was evidenced. Further, the feedback of the assessment (OF31) and collaborative approaches with suppliers (OF30) for measuring and identifying improvements opportunities, including the design and implementation of action plans, were identified as being critical for diffusing sustainability practices. The factors OF3, OF4, OF6, OF11, OF14, OF24, OF25, OF26, OF27, and OF28 also influenced implementation of supplier performance assessment (i.e. data gathering, assessment and suppliers feeding back). Finally, reviewing the performance programme (OF29) allows the adoption of feasible and realistic measures, which enables consistent diffusion of the sustainability practices.

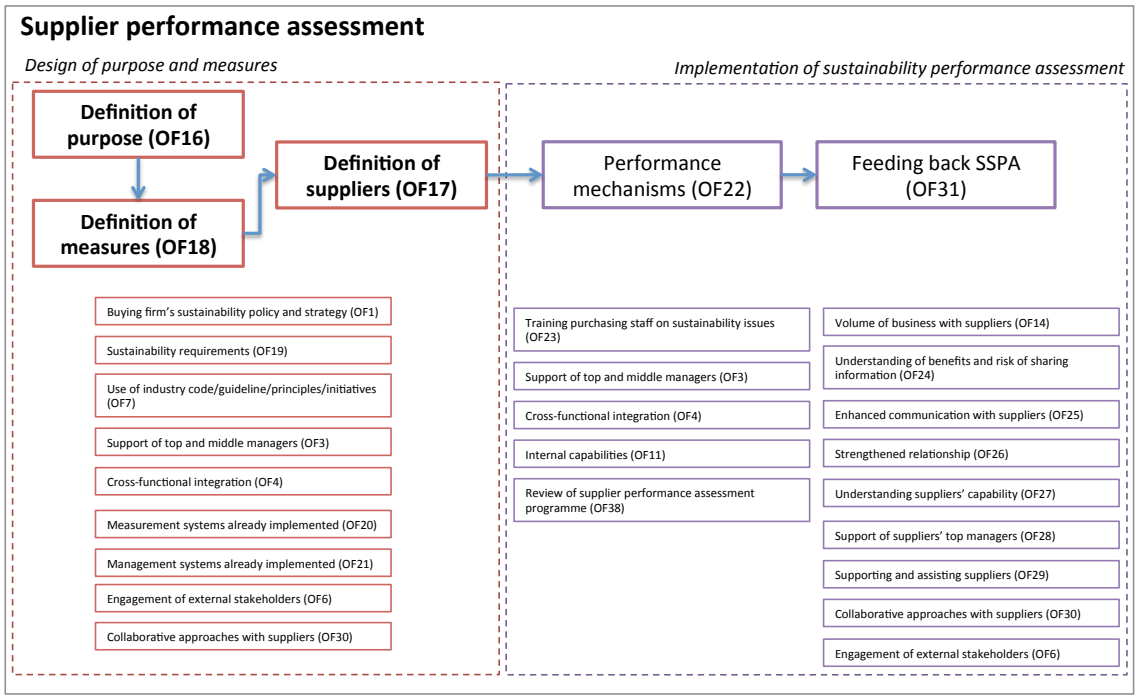

Fig. 7.4: Framework of organisational factors affecting the diffusion of environmental and social sustainability practices through the supplier performance assessment.

7.2.3 Supplier development

7.2.3.1 Sustainability practices diffused

All firms studied diffused sustainability practices through supplier development initiatives. Thirty environmental and social sustainability practices were identified. Most of them were practices listed in the sustainability requirements and monitored through the performance assessment (Table 7.6, p.147). For instance, chemical management, human rights (e.g. child labour) and working and labour conditions were practices diffused by transferring knowledge initiatives (e.g. training, seminars and manuals) to 1st tier suppliers ("Beverage A", "Cosmetics A" and "Textile A") and 2nd tier suppliers ("Beverage B" and "Cosmetics A").

Reducing packaging was also commonly diffused through joint design initiatives with packaging suppliers ("Beverage A", "Beverage B" and "Cosmetics A"). Furthermore, carbon management was diffused through different initiatives ("Beverage A" and "Cosmetics A"). "Beverage A" focused on key suppliers by awarding top-performing suppliers and sharing the best practices implemented by the suppliers engaged (e.g. energy efficiency, ISO14064 accreditation), as well as implementing a joint plan for reducing carbon footprint through a heat exchange project. "Cosmetics A" in turn engaged industrial suppliers only through transferring knowledge on carbon management.

Critical suppliers located in the 2nd tier were also developed through transferring knowledge initiatives focusing not only on meeting compliance (e.g. human rights) and improving performance (water management, wastewater management, soil management) but also building suppliers' capabilities (e.g.

sustainable agriculture practices, wages calculation, local development, management and finances, empowerment and leadership) ("Beverage B" and "Cosmetics A").

Table 7.6: Sustainability practices measured in the supplier performance assessment.

Sustainability practices		Beverage A		Beverage B		Cosmetics A		Textile A	
		1st tier	2nd tier	1st tier	2nd tier	1st tier	2nd tier	1st tier	2nd tier
Environmental management	Compliance with regulation	NE	NE	NE	yes	yes	yes	yes	U
	Sustainability requirements – practices listed (Compliance)	NE	NE	NE	yes	yes	yes	yes	NE
	Water management	NE	NE	NE	yes	yes	yes	NE	NE
	Water conservation	NE	NE	NE	yes	NE	yes	NE	NE
	Efficiency of material usage	NE	NE	NE	NE	yes	yes	yes	NE
	Wastewater treatment	NE	NE	NE	yes	yes	yes	NE	NE
	Waste management	NE	NE	NE	yes	yes	yes	NE	NE
	Carbon Management	yes	NE	NE	NE	yes	yes	NE	NE
	Chemical management	NE	NE	NE	yes	yes	yes	yes	NE
	Reducing packaging	yes	NE	yes	NE	yes	NE	NE	NE
	Use of recycled materials	yes	NE	NE	NE	NE	NE	NE	NE
	Biodiversity - conservation	NE	NE	NE	yes	NE	yes	NE	NE
	Integrated agriculture	NE	NE	NE	yes	NE	yes	NE	NE
	Reforestation	NE	NE	NE	yes	NE	yes	NE	NE
	Good manufacturing practices	NE	NE	NE	yes	NE	yes	NE	NE
	Sustainable agriculture practices	NE	NE	NE	yes	NE	yes	NE	NE
	Soil management	NE	NE	NE	yes	NE	yes	NE	NE
	Fertilization	NE	NE	NE	yes	NE	yes	NE	NE
Human rights	Sustainability requirements – practices listed (Compliance)	NE	NE	NE	yes	yes	yes	yes	NE
	Human rights	NE	NE	NE	yes	yes	yes	yes	NE
	Child labour	NE	NE	NE	yes	yes	yes	yes	NE
	Local development	NE	NE	NE	yes	NE	yes	NE	NE
	Empowerment	NE	NE	NE	yes	NE	yes	NE	NE
Working conditions	Compliance with regulation	NE	NE	NE	yes	yes	yes	yes	NE
	Sustainability requirements – practices listed (Compliance)	NE	NE	NE	yes	yes	yes	yes	NE
	Working and labour conditions	NE	NE	NE	yes	yes	yes	yes	NE
	Wages	NE	NE	NE	yes	yes	yes	yes	NE
	Cost Analysis	NE	NE	NE	yes	NE	yes	yes	NE
	Management and finances	NE	NE	NE	yes	NE	yes	NE	NE
	Leadership	NE	NE	NE	NE	NE	yes	NE	NE
	Food safety	NE	NE	NE	yes	NE	yes	NE	NE
	Heath and safety conditions	NE	NE	NE	yes	NE	yes	yes	NE
	PPE	NE	NE	NE	yes	NE	yes	yes	NE

NE – not employed
[-] Not evidenced
Based on Section 6.2.4.1 and Table 6.5, Section 6.3.4.1 and Table 6.10, Section 6.4.4.1 and Table 6.16 and 6.17, and Section 6.5.4.

7.2.3.2 Design of supplier sustainability development

Figure 7.5 (p. 148) presents the organisational factors evidenced in the cases as being influential for designing and implementing supplier sustainability development initiatives. More details are also shown in Table 7.7 (p. 149). The results show some interesting patterns that have not been addressed in the existing literature. For example, the organisational factors products and/or components characteristics/risk (OF5) and collaborative approaches with suppliers (OF30) were influential for designing the initiatives related to improvements in the packaging. In this initiative, collaborative approaches with

packaging suppliers were identified ("Beverage A", "Beverage B" and "Cosmetics A") but in a different context. For instance, "Beverage A" specified the design for reducing packaging and the suppliers implemented and evaluated them, whereas in "Cosmetics A"'s case the design was made by the suppliers based on the needs and characteristics presented by the firm. In "Beverage B", a co-design strategy was adopted between the firm, a packaging supplier and a machinery supplier to develop a new packaging. Interestingly, in these cases, the firms used support tools to assess the environmental impact of the design changes, such LCA simplified ("Beverage B" and "Cosmetics A") and carbon footprint ("Beverage A").

Chapter 4
Tables 4.5 & 4.6

Chapter 6
Tables 6.6, 6.11, 6.18 & 6.24

SCM		Organisational Factors	Number of citations	Influential for diffusion		Empirical rigour		Beverage A		Beverage B		Cosmetic A		Textile A	
				Env	social	Empirical	Conceptual / Review	Env	social	Env	social	Env	social	Env	social
Supplier development	Design	Definition of supplier development purpose (OF32)	2	X	X	Env	Both	X	X	X	X	X	X	X	X
		Definition of development Initiative (OF33)	1	X	-	Env	-	X	X	X	X	X	X	X	X
		Definition of suppliers to be engaged (OF34)	7	X	X	Both	-	X	X	X	X	X	X	X	X
		Supplier sustainability performance assessment (OF35)	15	X	X	Both	Both	X	X	X	X	X	X	X	X
		Buying firm's sustainability policy and strategy (OF1)	6	X	X	Both	Both	X	X	X	X	X	X	X	X
		Support of top and middle managers (OF3)	8	X	X	Both	Both	X	X	X	X	X	X	X	X
		Cross-functional integration (OF4)	7	X	X	Both	Both	X	NI	X	X	X	X	NI	NI
		Products and/or components characteristics/risk (OF5)	2	X	X	Env	Both	X	NI	X	NI	X	NI	NI	NI
		Internal implementation of sustainability practices (OF8)	15	X	X	Both	Both	NI	NI	NI	NI	X	X	NI	NI
		Sustainability requirements (OF19)	8	X	X	Env	Both	X	X	X	X	X	X	X	X
		Collaborative approaches with suppliers (OF30)	10	X	X	Both	Both	X	NI	X	X	X	X	NI	NI
	Implementation	Assessment of the impact of the supplier development initiative (OF36)	3	X	X	Both	-	X	X	X	X	X	X	NI	NI
		Support of top and middle managers (OF3)	2	X	-	Env	-	X	X	X	X	X	X	X	X
		Cross-functional integration (OF4)	1	X	-	Env	-	X	NI	X	X	X	X	NI	NI
		Internal capabilities (OF12)	9	X	X	Both	Both	X	X	X	X	X	X	X	X
		Training purchasing staff on sustainability (OF23)	1	X	-	-	Env	X	X	X	X	X	X	NI	NI
		Enhanced communication with suppliers (OF25)	10	X	X	Both	Both	X	X	X	X	X	X	NI	NI
		Strengthened relationship (OF26)	15	X	X	Both	Both	X	NI	X	X	X	X	NI	NI
		Understanding suppliers' capability (OF27)	3	X	X	Env	Both	X	NI	X	X	X	X	NI	NI
		Support of suppliers' top managers (OF28)	3	X	-	Env	-	X	NI	NI	NI	X	X	NI	NI
		Collaborative approaches with suppliers (OF30)	36	X	X	Both	Both	X	X	X	X	X	X	NI	NI
		Engagement of external stakeholders (OF6)	-	-	-	-	-	PI	NI	NI	NI	NI	NI	PI	PI
		Risk management of the development intiative (OF39)	-	-	-	-	-	NFI	NI	NFI	NI	NFI	NI	NI	NI

Env-Environment, X-Identified, NI-Not identified, PI-Previously identified and NFI-New factor identified]

Fig. 7.5: Organisational factors for diffusion of environmental and social sustainability practices through the supplier development.

Supplier sustainability development initiatives were influenced by the firms' sustainability policy and strategies (OF1) in three of four cases. For instance, in "Beverage A" and "Cosmetics A"'s cases the policy established key sustainability themes (e.g. carbon management, human rights) to be addressed to suppliers, whereas the responsible supply chain certification in "Beverage B"'s case specified key supply chain management activities (e.g. assessment and development) to adopt in the relationship with green coffee suppliers.

Table 7.7: Influential organisational factors for designing supplier sustainability development.

Design and implementation of supplier development	Beverage A	Beverage B	Cosmetics A	Textile A
Development purpose (OF32)	Improving performance & integrating strategies for carbon management	Meeting compliance, improving performance, building capability & integrating strategies	Meeting compliance, improving performance & building capability	Meeting compliance
Development initiatives (OF33) & Suppliers engaged in the initiative (OF34)	- *Award & Transferring knowledge* (annual educating training): Key IS - *Joint plan for improving packaging:* packaging suppliers - *Joint plan for reducing* carbon footprint: packaging suppliers - *Investment to increase supplier capacity*: rPET resin supplier	- *Award:* CG in Brazil - *Transferring knowledge* (educating initiatives & best practices manuals): CG all regions - *Co-design of machine and packaging*	- *Award:* BIS - *Transferring knowledge* (educating – annual training & technical assistance): BIS and key IS. - Joint plan for designing packaging: packaging suppliers	- *Sharing knowledge (educating initiatives):* garment suppliers
Policy/strategy (OF1)	2020 Sustainability plan	Responsible supply chain certification	2050 Sustainability vision	Not evidenced
Products and/or components characteristics/risk (OF5)	Carbon footprint	Simplified LCA	Simplified LCA	Not evidenced
Supplier sustainability performance assessment (OF35)	Used to map best practices and award suppliers (IS)	Used to map best practices and award suppliers (CG)	Used to design and implement action plans (Biodiversity ingredients suppliers) and award suppliers (both BIS & IS)	Not evidenced
Sustainability requirements (OF19)	Not evidenced	Sustainability practices considered in the contract.	Supplier code of conduct and guideline manuals & Policy of sustainable use of biodiversity ingredients	Supplier policy of engagement
Collaborative approaches with suppliers (OF30)	Joint plans	Co-design	Joint plan	Not evidenced

IS – Industrial suppliers / CF – Coffee growers / BIS – Biodiversity ingredients suppliers
Based on Section 6.2.4.1 and Tables 6.5, Section 6.3.4.1 and Tables 6.10, Section 6.4.4.1 and Tables 6.16 and Section 6.5.4.

The outcomes of the supplier sustainability performance assessment (OF35) were used to recognise top performing suppliers through award initiatives and map and share best sustainability practices implemented by them. Transferring knowledge initiatives considering aspects like how to measure properly and improve performance (Beverage B – Coffee growers and Cosmetics A – both

industrials and biodiversity ingredients suppliers) were also designed. Moreover, “Beverage B”, “Cosmetics A” and “Textile A” commonly developed transferring knowledge initiatives taking into consideration the sustainability requirements (OF19) in order to ensure that suppliers meet compliance.

7.2.3.3 Implementation of supplier sustainability development

All organisational factors were confirmed in this research as being influential for implementation of supplier development. Rich empirical evidence is added to the literature. For instance, the assessment of impact of the supplier development initiatives (OF36) was commonly done through the supplier performance assessment programmes (Beverage A, Beverage B and Cosmetics A). In general, this covered compliance and progress in the sustainability performance (both social and environmental practices). Leppelt et al. (2013) had identified the assessment of supplier development initiatives based on an empirical study that covered only social practices.

It was evidenced that the organisational factors’ support of top and middle managers (OF3), cross-functional integration (OF4) and training purchasing staff on sustainability issues (OF23), understanding suppliers’ capability (OF27) and support of suppliers’ top managers (OF28) influenced the development initiatives for diffusing both environmental and social practices. The procurement team conducted most of the transferring knowledge initiative. In “Cosmetic A”’s case only, cross-functional integration was identified in the transferring knowledge initiatives to industrial suppliers and waste picker cooperatives. The sustainability team was engaged to train suppliers when more technical aspects were covered (e.g. regulation, waste management, working conditions – risk). These findings add empirical evidence to the literature, extending previous researches that only focused on environmental practices (e.g. Agan et al., 2016; Dou et al., 2014a; Touboulic and Walker, 2015).

The engagement of stakeholders (OF6) was identified in the “Beverage A” and “Textile A”’s cases. Retailers and consumers were engaged by “Beverage A” to return the used PET bottlers to be recycled by the rPET resin supplier. In “Textile A”’s case, local NGOs were engaged to provide training to the garment suppliers. OF6 was previously identified in the literature as being an organisation factor that influenced the design of requirements and the design and implementation of performance assessment, but not as influential for implementing supplier development. This research suggests that OF6 is influential for diffusing both environmental and social sustainability practices, but only across the 1st tier industrial suppliers.

Risk management of development initiatives (OF39) is a new organisational factor identified in the supplier development, which has not been addressed in the literature. In “Beverage A”’s case, a joint venture to increase the rPET resin supplier’s capacity was established and the contract was the mechanism to manage the risk. In this example, the firms (buyer and supplier) integrated their sustainability strategies to reduce carbon emission by increasing the availability of rPET in the market. The use of patents (Beverage B) and non-disclosure agreements (Cosmetic A) were also evidenced when the buyers and packaging suppliers collaborate to co-design or redesign the packaging in order to reduce the environmental impact (e.g. carbon).

To sum up, Figure 7.6 shows a comprehensive view of the organisational factors influencing the design and implementation of supplier sustainability development. The results presented suggested that the definition of purpose (OF32) and development initiatives (OF33), as well as the suppliers to be engaged (OF34) were critical in the design phase. The organisational factors OF1, OF3, OF4, OF5, OF8, OF19, OF30 and OF35 also took into consideration both environmental and social sustainability practices in the design of supplier development. In the implementation of the initiatives, the factors OF3, OF4, OF6, OF11, OF23, OF25, OF26, OF27, OF28 and OF30 were critical. Moreover, the assessment of supplier development impact (OF36) and risk management (OF39) ensured progress, updating and continuity of the initiatives. With exception of factors OF5 and OF39, the factors evidenced are influential for diffusing both environmental and social sustainability practices across both 1st and 2nd tier.

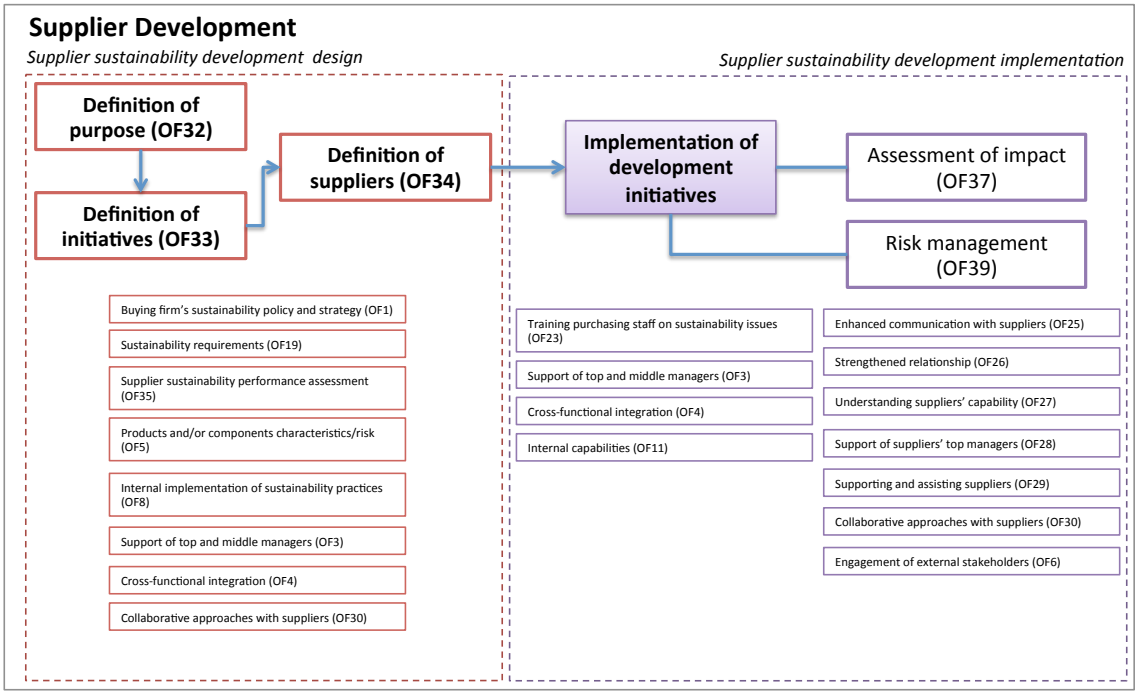

Fig. 7.6: Framework of organisational factors affecting the diffusion of environmental and social sustainability practices through the supplier development.

7.3 DISCUSSION

In this section, the findings related to the environmental and social practices diffused by the firms studied and the influential organisational factors are discussed.

Moreover, the organisational factors identified in Chapter 6 and discussed in the previous section are analysed with the lens of the diffusion of innovation theory (Roger, 2003), especially the elements communication channel, social system and time. Buyers use the communication channels to exchange information, create and share knowledge and persuade suppliers to change their attitude forward the sustainability practices and implement them. The

mechanisms and initiatives adopted in the supplier selection, performance assessment and development are therefore considered as being the communication channels. The social system consists of the members of the social system (innovator/developer; change agent, who influences the adopter to implement the practice and adopters), norms (expected behaviour in the social system) and structure (arrangement among members and communication flow in the social system). Finally, the element time will be analysed based on the innovation-decision process to implement sustainability practices (knowledge, persuasion, decision, implementation, and confirmation) and how fast they are diffused in the supplier base.

7.3.1 Sustainability practices and organisational factors in the supplier selection

7.3.1.1 Supplier selection

This study covers the use of both environmental and social sustainability practices as requirements to select suppliers. The evidence presented in the Table 7.1 (p. 134) extends from three previous papers which looked at environmental practices considered in the supplier selection (e.g. Govindan et al., 2015; Igarashi et al., 2013; Jabbour and Jabbour, 2009) and more recently the research conducted by Winter and Lasch (2016), which examined how brand label manufacturers and retailers applied environmental and social sustainability practices in the supplier evaluation of the fashion and apparel industry. For instance, in "Textile A"'s case similarities are observed in terms of the practices related to human rights and working conditions. On the other hand, this PhD research presents different environmental practices, such as the environmental performance measurement that suppliers need to implement and the adoption of certification schemes related to chemical management (e.g. Oekotex and Bluesign certification schemes) for selection of suppliers at risk in terms of chemical product contamination and environment contamination. Interestingly, this was evidenced as being requested in different tiers.

This PhD research also provided evidence that even though there were different requirements according to the supplier's typology, overall the sustainability practices listed were similar for all industrial suppliers and ingredients suppliers in the 2nd tier. This contrasted Holt (2004), who surveyed firms from diverse sectors (e.g. manufacturing, retail, construction, etc.) and found the use of different sustainability practices according to the supplier category.

Furthermore, some sustainability practices have not been reported in the literature as there are criteria that suppliers need to meet to be selected, such as the environmental practices used in the 2nd tier agricultural suppliers by "Beverage A" and "Cosmetics A", like soil management and conservation of ecosystems. Training employees on sustainability, implementation of social inclusion programmes and engagement of suppliers to comply with human rights are examples of social practices that have not received more attention in the literature.

This research also adds detail to the literature by providing empirical evidence for considering both environmental and social practices in the design of the requirements (e.g. Blome et al., 2014; Klassen and Vereecke, 2012;

Lamming and Hampson, 1996; Preuss, 2001; Tong et al., 2012). Interestingly, factor OF4 was previously supported in the literature by empirical papers (i.e. surveys or case studies) just considering environmental practices, and OF6 and OF7 for social practices. In general, the firms sought to establish requirements to clarify the meaning of sustainability (OF2) and to measure supplier compliance (OF9) by prioritising the sustainability practices across the supplier base. Interestingly, some sustainability practices adopted for selecting suppliers went beyond compliance with regulation. This indicates that buying firms can influence their suppliers to implement best sustainability practices.

The framework of organisational factors affecting the diffusion of environmental and social sustainability practices through the supplier selection illustrated in Figure 7.2 (p. 139) suggested an understanding of the influential organisational factors and how both environmental and social sustainability practices can be considered in the supplier selection processes, as recommended by Morali and Searcy (2013). Therefore, the supplier selection through the evaluation process and formalization of the relationship enforce suppliers to implement the expected sustainability practices, which were defined in the requirements.

7.3.2.2 Supplier performance assessment

The evidence presented in Table 7.4 (p. 140) extends previous researches by presenting both environmental and social sustainability practices measured in multi-tiers (e.g. Ahi and Searcy, 2015; Chardine-Baumann and Botta-Genoulaz, 2014; Hassini et al., 2012; Schaltegger and Burritt, 2014; Varsei et al., 2014). Moreover, this research adds some social performance measures which have not been systematically covered in the current literature, such as the inclusion of disabled employees in the workplace. The majority of measures adopted by the firms studied to assess their supplier performance took into consideration environmental and social practices listed in the sustainability requirements. In general, the performance assessments are based on individual measures (e.g. carbon management and marker efficiency) and a set of measures covering different sustainability themes.

Most of the existing literature on diffusion of sustainability practices through performance assessment simply analyses the practices measured in general, without distinguishing where the practices were measured (i.e. tiers) and there is little empirical evidence. Moreover, even the supplier sustainability performance assessment enforces the implementation of sustainability practices listed in the requirements, and few papers empirically presented links between the sustainability requirements or policies and the measures employed (Hoejmose and Adrien-Kirby, 2012; Testa and Iraldo, 2010).

Several studies argued that supplier performance assessment is influential for buying firms to build long-term relationship with suppliers, especially due to the improvements in their performance (e.g. Beske and Seuring, 2014; Gold et al., 2010). Likewise, this research adds rich empirical data to the literature on diffusion of sustainability practices through supplier performance assessment. For instance, the findings suggest that the supplier performance programmes were helpful for transferring knowledge and improving not only certain deficient measures or compliance with the regulation and requirements, but also

individual and general performance measures. Moreover, the feeding back process and collaborative approaches with suppliers to build improvement plans helped suppliers to improve not only their performance but also to build up capabilities to manage sustainability performance. Therefore, this research is in line with Agan et al. (2016), who stated that supplier performance assessment could be influential for suppliers to become more efficient and qualified by implementing sustainability practices.

7.3.2.3 Supplier development

The empirically-generated results presented in the Table 7.6 (p. 147) indicates the environmental and social practices diffused across the supplier base. None of the current literature offers a list of both environmental and social sustainability practices diffused within 1st and 2nd tier suppliers through supplier development initiatives. Moreover, some diffused sustainability practices have not been covered in the literature, such as empowerment, food safety, both evidenced in the 2nd tier.

Social sustainability practices were mostly diffused by transferring knowledge initiatives with the purpose to help both 1st and 2nd tier suppliers comply with requirements. Environmental practices were in turn diffused through different initiatives including joint plans, co-design and investment. Interestingly, the organisational factors - definition of development purpose (OF32) and initiatives (OF33) have been supported by empirical papers that only covered environmental practices (Bai and Sarkis, 2010; Dou et al., 2014b).

Figure 7.6 (p. 151) is generated from rich evidence collected from leader sustainability firms and adds empirical evidence to previous research on supplier development, such as Agan et al. (2016), Bai and Sarkis (2010) and Sancha et al. (2015). It integrates organisational factors which affect the diffusion of both environmental and social sustainability practices through supplier development. More importantly, it distinguishes the importance of the factors in the design and implementation of the development initiatives, which has not been systematically covered in the literature.

7.3.2 Analysis of the organisational factors against the diffusion of innovation theory

7.3.2.1 Supplier selection

The diffusion of sustainability practices through the supplier selection consists of the effort to communicate the sustainability requirements, evaluate suppliers and use contracts to drive compliance with the requirements (norms of the social system). The sustainability requirements (Tables 7.1, p. 134) provide practices that suppliers need to implement in order to be selected and form the expected behaviour in the base (social system). Consequently, the design of the requirements is a starting point for the diffusion of the sustainability practices.

The use of industry codes/guidelines/principles/initiatives (OF7) is consistent for establishing sustainability practices and the expected behaviour in the requirements. This provides knowledge to the supplier on sustainability practices which are compatible and commonly implemented, for example in

specific sectors (e.g. AIM-Progress forum – fast-moving-consumer-goods sector, WFSGI – sporting goods industry). Therefore, this is related to innovation attributes (compatibility and observability). Another example was found in "Textile A"'s case, related to the certification Oeko-tex. This certification was universally adopted in different tiers as a criterion for selecting suppliers at risk in terms of chemical contamination in the component (e.g. fabric, yarn). Interestingly, the organisations responsible for the codes/guidelines/principles/initiatives (e.g. AIM-Progress Forum, UEBT and WFSGI) act as the innovators, providing the sustainability practices (innovation), and the buyers (firms studied) as the change agent, diffusing the standards across the social system (supplier base).

The engagement with an NGO and a brand team (OF6) and collaborative approaches with supplier representatives (e.g. sugar growers and processors) (OF30) are also influential for buyers and suppliers to enhance mutual knowledge when jointly designing sustainability requirements, as evidenced in the joint design of the sustainable agricultural requirements for the sugar growers - 2nd tier in "Beverage A"'s case. These allowed both buyer and suppliers to share their expectations on sustainability (innovation attribute – compatibility). The collaborative approaches with grower suppliers also helped them understand the benefits (innovation attribute – advantage), challenges related to the implementation of the sustainable agriculture practices (complexity) and enable them to observe the practices commonly implemented in the social system (observability). Therefore, this mutually enriches knowledge on sustainable agriculture practices, affecting the suppliers' knowledge and perception of the practices' attributes and allows them to form the right attitude toward the implementation of sustainability practices (Figure 7.7). Interestingly, this made the NGO, "Beverage A" and their suppliers (processors – 1st tier and growers – 2nd tier) act as the innovator and change agent in the design of the requirement at the same time.

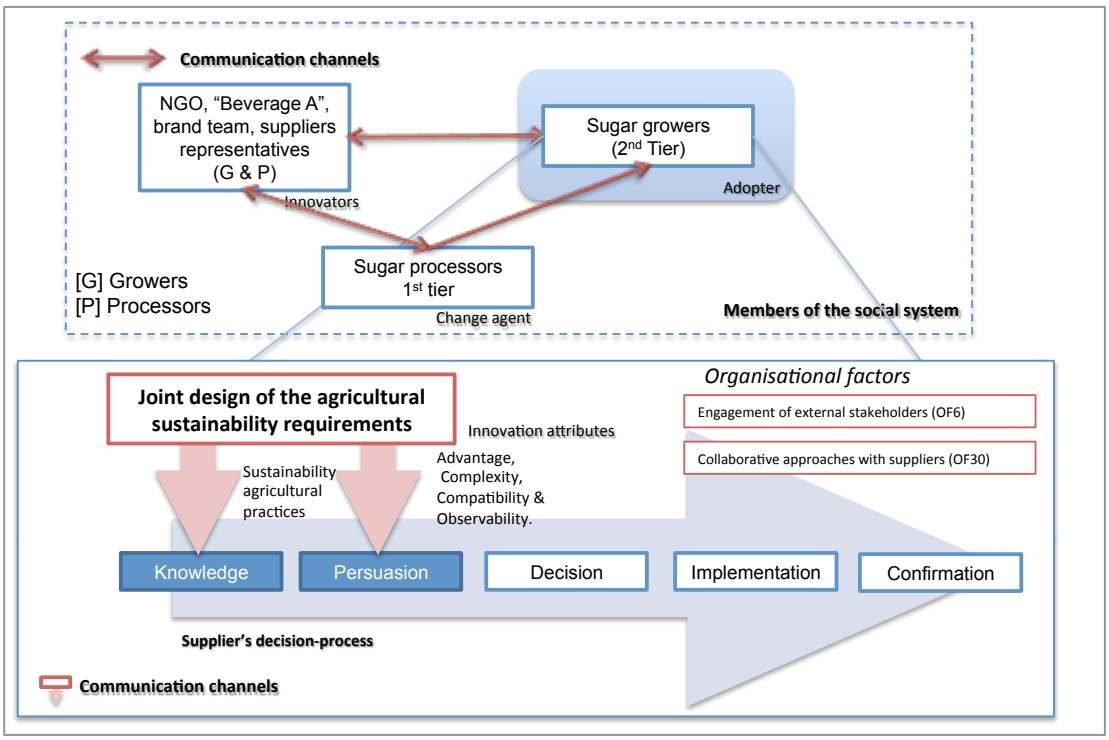

Fig. 7.7: Joint design of requirements and the lens of DoI.

Providing a clear meaning of sustainability (OF2) and a basis for measuring supplier compliance (OF9) are effective for creating knowledge on how sustainability is considered by the buyers, and therefore, how it will impact the implementation of the requirements.

In terms of the implementation of the sustainability requirements, the factors OF1O (clear communication of the sustainability requirements), OF11 (supplier evaluation) and OF15 (use of contracts) are communication channels in the supplier selection. The communication of the requirements acts as a source of knowledge for suppliers in terms of the sustainability practices requested. The supplier evaluation is not only important as source of knowledge, but also acts in the persuasion of the supplier to implement sustainability practices, especially the attribute of advantage (to be selected suppliers need to implement the practices listed in the requirements) and in the confirmation of implementation. As the sustainability dimension is equally important to other dimensions (e.g. quality, cost, delivery, etc.) (OF37), this is considered as a way to highlight the sustainability practices and persuade suppliers to implement them. Finally, the formalisation of the sustainability requirements through the contracts enforces compliance with them and therefore forms the expected behaviour across the social system. This is an authority decision demanding suppliers to comply. Therefore, OF15 establishes the norms of the system and influences suppliers' decision process (decision and implementation).

Table 7.8 sorts the organisational factors according to the DoI elements. The factors OF1 and OF15 establish the norms of the system. The factors OF3 (support of top and middle managers), OF4 (cross-functional integration), OF6 (engagement of stakeholders for suppliers' evaluation), OF8 (internal implementation of sustainability practices), OF12 (internal capability, e.g. people, resources), OF23 (training purchasing staff on sustainability) strengthen the communication flow with suppliers and are therefore associated with the structure of the social system. The scope for implementation of the sustainability requirements (OF13), OF6 and OF30 are associated with the definition of the members of the social system and their location (i.e. tiers of the supplier base). The supplier's decision process to implement sustainability practices during the supplier selection is influenced by the factors OF2, OF6, OF7, OF9, OF10, OF11, OF15, OF30 and OF37. The structure of the social system is linked with the factors OF3, OF4, OF8, OF12 and OF23. These factors facilitate the communication flow and represent the knowledge and expertise of the buyers on the implementation of sustainability practices.

Table 7.8: Organisational factors and the elements of DoI – supplier selection.

DoI Elements				
Communication channel	**Time – innovation decision process**	**Social system**		
		Norms	**Members**	**Structure**
OF10, OF11 & OF15	OF2, OF6, OF7, OF9, OF10, OF11, OF15, OF30 & OF37	OF1 & OF15	OF6, OF13 & OF30	OF3, OF4, OF8, OF12 & OF23

7.3.2.2 Supplier performance assessment

The definition of performance assessment purpose (OF15) and consistent measures (OF16) were in general aligned with the norms with the system, i.e.

compliance with the sustainability requirements (OF19), which is emphasised by the contracts. Furthermore, performance assessment was also effective for persuading suppliers to implement practices and improve performance. These performance improvements were in line with the buyers' sustainability policy or strategy (OF1) (e.g. sustainability plan – carbon challenge – Beverage A's case). Therefore, the performance assessment seeks to ensure compliance with the requirements and improving performance.

As evidenced in the design of the sustainability requirements, the factors OF6, OF7 and OF30 have a similar effect in the design of performance measures, i.e. they are influential to increase mutual knowledge and define sustainability practices that are usually measured (innovation attributes - compatibility and observability).

Overall, critical industrial suppliers located in the 1st tier and material suppliers (ingredients and fabrics) in the 2nd tier are frequently assessed (OF22). This is important for suppliers to form an attitude toward the sustainability practices measured based on an understanding of the advantage (benefits to measure), complexity (challenges to measure), compatibility (measures in line with suppliers' capability) and observability (common measures in the supplier base). Interestingly, when the assessment mechanisms are compulsory, such as 2nd or 3rd party audits, the mechanisms were more effective in the steps of the decision, implementation and confirmation. By contrast, voluntary performance mechanisms, such as the self-evaluation identified in Cosmetics A's case, were more effective in the decision, implementation and confirmation steps, when the firm kept the volume of orders with the suppliers (OF14), i.e. when orders were reduced, the suppliers tended to be less committed to measure their performance and implement sustainability practices to improve performance.

The feedback provides suppliers knowledge in terms of its strengths and weaknesses (OF31 – Feeding back) and persuades them to keep progressing in sustainability performance (norm of the system). Based on the feedback given, suppliers are requested to treat non-compliances by themselves. This is a sort of authority decision imposed by the buyers. In contrast, it is also evidenced that collaborative approaches with suppliers (OF30) to design and implement improvement plans also affect the innovation decision process, providing knowledge and forming the attitude to suppliers to implement the sustainability practices (e.g. carbon management – industrial suppliers - 1st tier and sustainable agriculture practices – 2nd tier). Best practices implemented by top performing suppliers are also shared with other suppliers during the design of the improvements plan, as well as the development initiatives (next subsection). This enhances the diffusion of sustainability practices across the suppliers' base as seen in Figure 6.5 in Chapter 6 (p. 101). This figure shows an increase of the rate of adoption of sustainable agricultural practices across suppliers monitored in Brazil (wastewater treatment), India (Irrigation) and Costa Rica (endemic trees) between 2009 and 2012.

When the volume of business with suppliers (OF14) is reduced however, either the measurement or the implementation of practices for improving performance is negatively affected, hence they become less committed to the programme (not compulsory, e.g. self-evaluation questionnaires).

Therefore, the performance mechanisms (measuring and assessing) (OF22), feeding back (OF31) and collaborative approaches with suppliers (OF30) affect in general all stages of the supplier decision process; starting from gaining knowledge of sustainability measures, checking the implementation of the practices to improve the performance, to confirming the progress (Figure 7.8). Table 7.9 sorts the organisational factors influencing the supplier sustainability performance assessment according to the elements of DoI. The factors OF22 and OF31 are the communications channel in the implementation of the supplier performance assessment. The factor understanding of benefits and risk of sharing information (OF24) is sorted in the social system (structure) and is influential in providing an expected behaviour in the system in terms of the commitment of a supplier to be assessed and comply with the requirements.

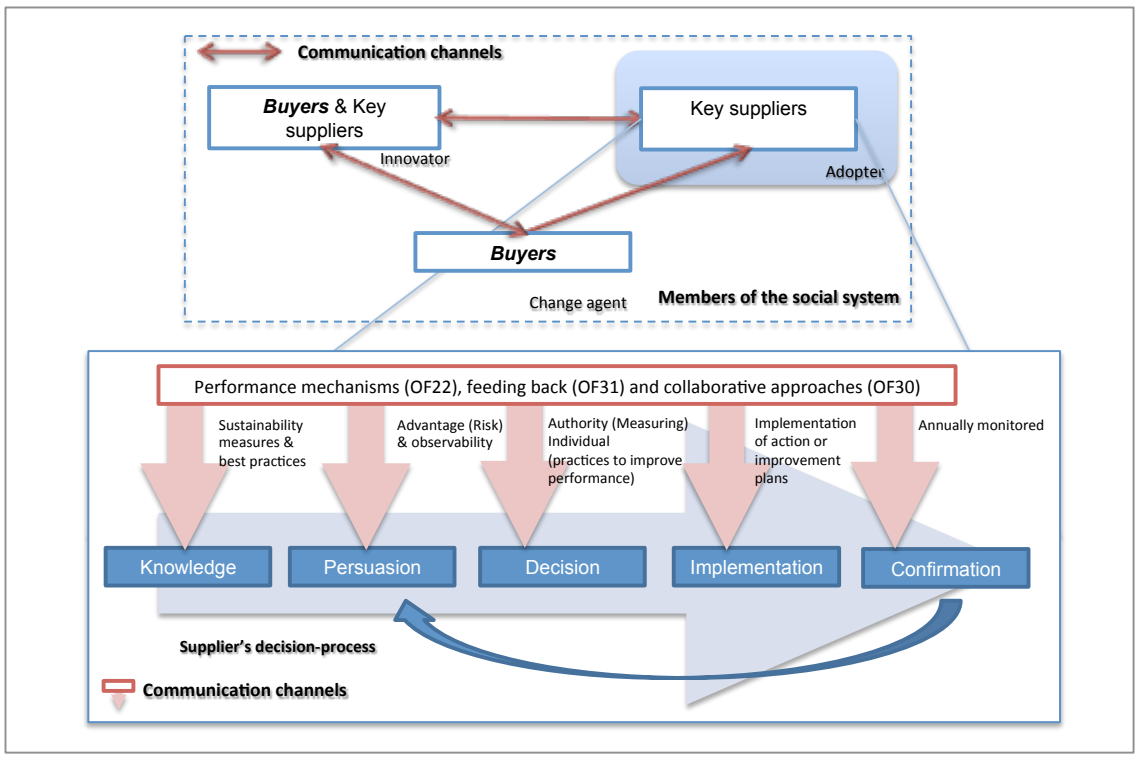

Fig. 7.8: Supplier performance assessment and the lens of DoI.

Table 7.9: Organisational factors and the elements of DoI – supplier performance assessment.

DoI Elements				
Communication channel	**Time – innovation decision process**	**Social system**		
		Norms	**Members**	**Structure**
OF22 & OF31	OF6, OF7, OF14, OF22, OF29, OF30 & OF31	OF1, OF15 & OF19	OF6, OF17 & OF30	OF3, OF4, OF12, OF16, OF18, OF20, OF21, OF23, OF24, OF25, OF26, OF27, OF28 & OF38

7.3.2.3 Supplier development

The supplier sustainability development initiatives identified in this research focused on meeting compliance, improving performance, building capabilities and integrating strategies. Overall, the definition of these purposes was based on the sustainability requirements, sustainability policy/strategies and the outcomes of the performance assessment, which emphasise the norms of the system.

The development initiatives commonly adopted were transferring knowledge, award and joint initiatives based on collaborative approaches with critical suppliers. Table 7.10 presents how these initiatives affect the supplier decision process and the role of the members of social system in the diffusion, i.e. innovator (responsible for developing the practice), change agent (responsible for diffusing the practices) and the adopter of the practices. It should be noted that these initiatives are the communication channels. Transferring knowledge initiatives (e.g. educating, distributing manual/guidelines and technical assistance) were commonly associated with the first three purposes. Further, the buyers acted as the change agent trying to diffuse the sustainability practices listed in the requirements, apply best practices mapped from the supplier performance assessment and build supplier capability to manage sustainability.

Table 7.10: Development initiatives and DoI elements.

Development initiatives (Communication channels)	**Time – innovation decision process**	**Social System - members**				
		Innovator	**Change Agent**	**Adopters**		
				Scope of diffusion		
				1st tier	**2nd tier**	***n* tier**
Transferring knowledge (evidenced in all firms studied)	Knowledge & persuasion (e.g. advantage, challenges)	-	Firms	Industrial suppliers (all cases)	Ingredients suppliers (Beverage B & Cosmetics A's suppliers)	-
Award (Evidenced in Beverage A, Beverage B & Cosmetics A's cases)	Knowledge & persuasion	-	Firms	Industrial suppliers (Beverage A & Cosmetics A's suppliers)	Ingredients suppliers (Beverage B & Cosmetics A's suppliers)	-
Heat exchange (Evidenced in Beverage A's case)	All stages of the decision process	Firm & glass bottle supplier	-	Firm & glass bottle supplier	-	-
Improving packaging (Beverage A's case)	All stages of decision process	Firm	Firm	Packaging supplier	-	-
Improving packaging (Cosmetics A's case)	All stages of decision process	Supplier	-	Firm & supplier	-	-
Improving packaging (Beverage B's case)	All stages of decision process	Firm and supplier	-	Firm and supplier	-	-

An award for top performing suppliers is regarding improving performance and affects the supplier innovation-decision process (knowledge and persuasion). This enhances supplier knowledge and is influential for forming the attitude to implement best sustainability practices (e.g. advantage – image and observability of best practices implemented).

Finally, the joint initiatives, heat exchange and joint venture ("Beverage A") and joint packaging design ("Beverage A", "Beverage B" and "Cosmetics A") are related to the last two purposes and are based on collaborative approaches

with suppliers. These initiatives were jointly designed and implemented, assisting both suppliers and buyers to increase knowledge, capabilities needed, understand the challenges and benefits and to implement the practices. These were based on collective decisions and mutual effort to implement sustainability practices. Interestingly, there is a variance in terms of the actors. For instance, in the joint initiatives for exchanging heating ("Beverage A"), the glass bottle suppliers and the buyer integrated their strategies for reducing carbon and played the role of the innovator and the change agent in the development of the initiative, sharing responsibilities and mutual effort. Interestingly, in the initiative for improving packaging three scenarios were evidenced in terms of the actors: suppliers acted as the innovators and presented new packaging to the buyer according to its needs and specifications ("Cosmetics A"), suppliers followed the design presented by the buyers ("Beverage A") and both suppliers and the firm jointly designed the packaging ("Cosmetics A").

Table 7.11 sorts the organisational factors related to the supplier development based on the DoI elements. Interestingly, the assessment of impact of the supplier development initiative (OF36), which is generally done through the supplier performance assessment mechanisms, is a communication channel critical for confirming the benefits of the sustainability practice implemented (supplier innovation decision process). The organisational factors OF6 and OF39 (risk management of the development initiative) are also influential in the supplier decision process. For instance, in "Textile A"'s case, NGO's were engaged in transferring knowledge initiatives. "Beverage A" engaged consumers and retailers (OF6) and collaborated with the rPET suppliers to raise the amount of used PET bottles which were collected and reprocessed. This engagement persuaded rPET suppliers, increasing their exposure among the customers, retailers and government.

Table 7.11: Organisational factors and the elements of DoI – supplier development.

DoI Elements				
Communication channel	**Time – innovation decision process**	**Social system**		
		Norms	**Members**	**Structure**
OF33 & OF36	OF6, OF30, OF33, OF36 & OF39	OF1, OF15 & OF19	OF6, OF30 & OF34	OF3, OF4, OF5, OF8, OF11, OF23, OF25, OF26, OF27 & OF28

7.3.2.4 Enhancing the diffusion of sustainability practices

The innovation decision-making process and the way that it is influenced lie at the heart of the DoI (Frambach, 1993). Rogers (2003) argued that different communication channels have different effects on a member who passes through the innovation-decision process. Indeed, in this research six organisational factors are related to diffusion mechanisms, which are the communication channels used in the supplier selection, performance and development. It was empirically evidenced that they play a different role in the supplier decision process to implement sustainability practices (Figure 7.9).

In the supplier selection, they provide clear communication of sustainability requirements (OF10), supplier evaluation (OF11) and use of contract (OF15). Whereas OF10 and OF15 are related to the knowledge and persuasion steps, OF15 forces the implementation. The supplier innovation-decision process in

the selection is also affected by OF2 (providing a clear meaning of sustainability) and OF9 (basis for measuring supplier compliance). Back to the design of the requirements, it is important to emphasise the importance of the engagement of external stakeholders (OF6), use of industry code/guidelines/principles/initiatives (OF7) and collaborative approaches with suppliers (OF30) for persuading suppliers, especially in terms of the compatibility and observability of the attributes. The equal importance of sustainability in the evaluation (OF37) is also a factor that enhances the diffusion of practice, being influential in the supplier decision process.

Performance mechanisms (OF22) and feeding back supplier performance assessment (OF31) are also communication channels which affect the supplier decision process. Supporting and assisting suppliers in the assessment (OF29) is critical for measuring performance, which enhances knowledge and reliability of the sustainability practices measures or data transfer (e.g. consumption of resources). Moreover, collaborative approaches with suppliers (OF30) were also critical for improving suppliers' compliance performance and individual sustainability measures or general programme. Therefore, OF29 and OF30 were also critical for suppliers as they pass through the innovation decision process.

In terms of supplier development, the development initiatives had different influences on the supplier innovation-decision process as presented in Table 7.9 (p.158). In general, knowledge transfer and awards initiatives were influential in the knowledge and persuasion steps, whereas joint initiatives influenced suppliers in all steps of the decision process. This is justified by the fact that these joint initiatives are generally established based on collective decision and mutual effort with definition of responsibilities and capabilities to implement the sustainability practices. The communications channels were the definition of development initiatives (OF33) and assessment of the impact of the supplier development initiative (OF36). Finally, the engagement of stakeholders (OF6), OF30 (collaborative approaches with suppliers) and risk management of the initiative (OF39) enhanced the diffusion of sustainability practices and were influential in the supplier decision process.

Figure 7.9 (p. 162) sorts the organisational factors as the communication channel and enhancers. These categories are influential in the supplier decision process to implement sustainability practices and therefore enhance the diffusion of practices. In addition, some factors strengthened the communication flow with suppliers (structure of the communication channel) in the supplier selection, performance and development (previously sorted in tables 7.8, 7.9. and 7.11).

This application, in the context of the diffusion of sustainability practices, led by buying firms across their supplier base extends previous researches, providing original contributions:

- This highlights the role of the leader sustainability firms (buying firms) on the impact of supplier's innovation decision process.
- Different DoI elements that have not been widely covered in the current literature (please see section 4.4 in chapter 4), are applied to evaluate the impact of buying firms on the suppliers' decision, such as communication channel and social system.

- This research presents a wide range of organisational factors which are influential for diffusion. To date, the researchers have essentially covered the factors OF4, OF5, OF6, and OF7, in the design of requirements and OF3, OF4, OF6, OF9 and OF10 in the implementation (e.g. Carbone et al., 2012; Marimon et al., 2011). Factors associated with the performance assessment have not been encompassed and in the supplier development, only OF30 has been covered (Tong et al., 2012).

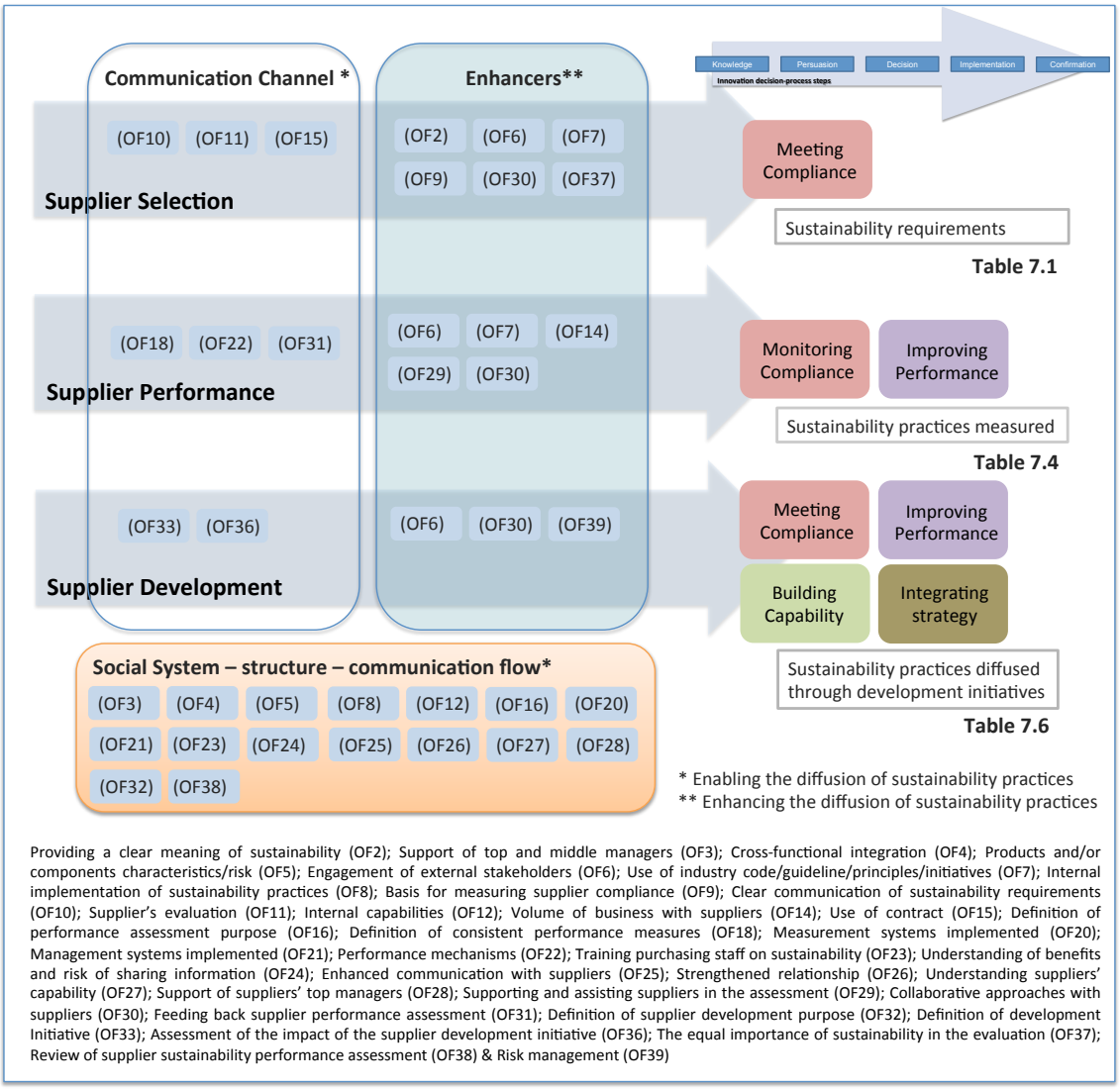

Fig. 7.9: Framework of organisational factors enhancing the diffusion of sustainability practices across the supplier base

CHAPTER 8
Conclusions

8.1 INTRODUCTION

This chapter draws together the conclusions of the study. An overview of the research is presented in section 8.2. The key contributions to theory and academic implications are examined in section 8.3. Limitations and opportunities for further research complete this chapter.

8.2 OVERVIEW OF THE RESEARCH

This research is theory building in nature and has developed the foundations of a new theory of diffusion of environmental and social sustainability practices across the supplier base. Figure 8.1 provides an overview of the research in terms of research aim and research context and scope, theoretical study and research methodology.

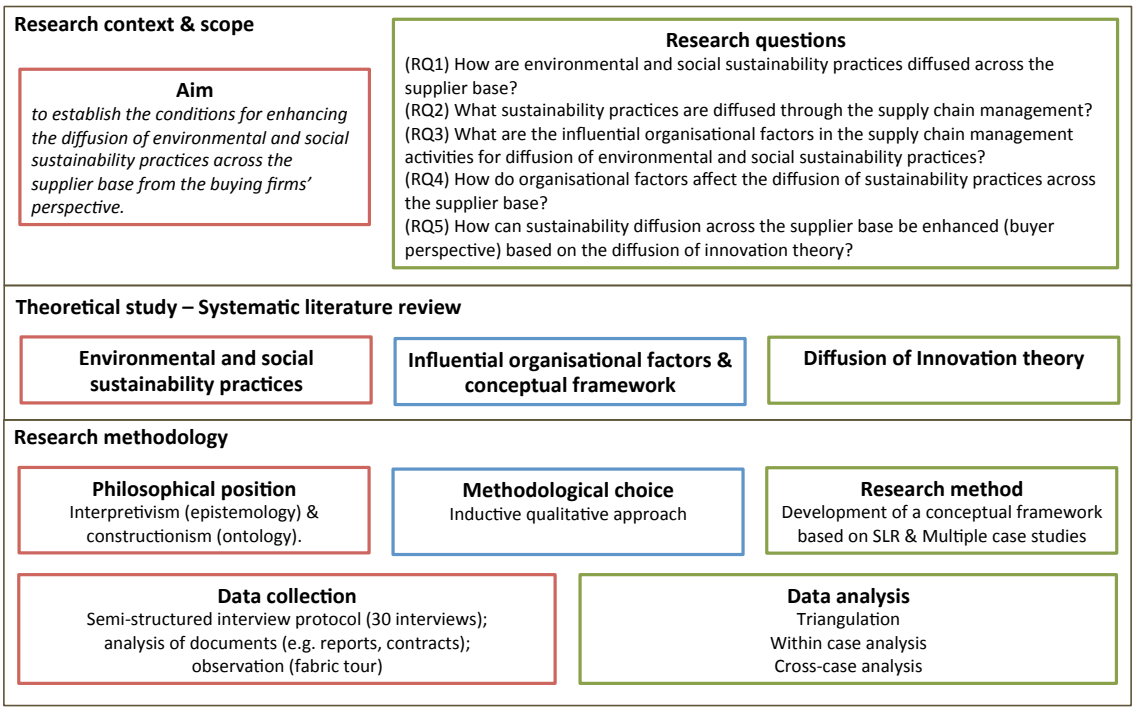

Fig. 8.1: Research overview.

It is important to highlight that the systematic literature review supported some decisions made in the research methodology and the discussion. For example, the conceptual framework provided in chapter 3 drove the design of the open-questions interview protocol. Key findings of the SLR were also taken into consideration in the discussion. It is important to highlight some of them:

- the core supply chain management activities involved in diffusion of environmental and social sustainability practices across the supplier base are supplier selection, supplier performance assessment and supplier development (Chapter 2);
- 40 environmental and 25 social sustainability practices diffused through the three aforementioned SCM activities, ranging from compliance (e.g. regulations and human rights), management (implementation of code of ethics), measurement (e.g. carbon footprint, health and safety conditions) to design improvements (e.g. material, packaging and technologies) (Chapter 2);
- 36 influential organisational factors were identified in the literature as being important for diffusion of sustainability practices (Chapter 3);
- Conceptual framework for diffusion of sustainability practices, which integrates supply chain management activities and points out the most critical variables influencing the sustainability practices diffusion is presented in Chapter 3); and
- The features related to the application of DoI in the sustainable supply chain management field (Chapter 4).

8.3 CONTRIBUTIONS TO THE KNOWLEDGE AND IMPLICATIONS

The data analysis was carried out based on a triangulation of different sources of data, including 30 interviews with directors or managers of functions which have a strong relationship with suppliers, such as procurement, R&D, sustainability and communication, a large array of documents (e.g. contracts template, supplier audit reports, sustainability reports) and the fabric tour. The findings suggested there are a total of 39 organisational factors that affect the diffusion of environmental and social sustainability practices across the supplier base (please see, Figure 6.11, p. 132).

Cross-case analysis and the application of DoI as a filter to enhance the diffusion of sustainability practices allow the generation of critical empirically-based findings that contribute to the knowledge. The contribution to the knowledge and the implications are divided into three areas, namely:

- Sustainability practices diffused and supply chain management activities;
- Organisational factors for sustainability practices diffusion; and
- Diffusion of innovation theory.

The research reported in the thesis establishes the conditions for enhancing the diffusion of environmental and social sustainability practices across the supplier base. All the theoretical contributions and implications listed above are not systematically encompassed in the current literature. In general, these supported an understanding of the research questions of this research.

8.3.1 Sustainability practices diffused and supply chain management activities

This research identified environmental and social practices diffused through supplier selection (implementation of requirements), performance assessment and development (Tables 7.1, 7.4 and 7.6). This provides the answered to the research question RQ2 (What sustainability practices are diffused through the supply chain management?)

This map of sustainability practices provides a novel perspective; hence it distinguishes practices diffused across to different supply chain tiers, as well as the mechanism/initiatives employed to diffuse them. Inclusion of disable employees, empowerment, and sustainable agriculture practices are examples of practices that have not been covered in the literature.

The finding contributes to a body of the literature confirming the environmental and social sustainability practices diffused through supply chain management activities. The findings suggested that more emphasis was given to environmental practices than social practices. In general, social practices were more related to compulsory level (e.g. human rights) and were evaluated (selection), monitored (performance) and diffused through development (especially educating initiatives) in both 1st tier and 2nd tier. Compliance practices, like chemical management (limits of hazardous substances), human rights and working conditions are commonly diffused practices across both 1st tier and 2nd tier through the supplier selection.

This research also supported that non-compulsory practices could raise environmental performance of suppliers, for instance efficient use of resources and pollution prevention. This was identified in outsourced suppliers responsible for processing materials or ingredients, which were directly purchased by the buying firms to suppliers in 2nd tier. On the other hand, these practices were strongly related to the aim to reduce waste of the material purchase and increase the productivity of the outsourced suppliers.

Certification schemes related to hazardous substances limits (e.g. Oeko-tex and Bluesign) are widely diffused in the textile sector through supplier selection (common practices requested) across multi-tiers. For example, brands request to fabric suppliers (2nd tier) to implement these schemes, garment suppliers also requested to fabric and yarn suppliers (3rd tier) and fabric suppliers to yarn suppliers.

Critical materials suppliers in the 2nd tier were more likely engaged by specific procurement teams through the selection, performance and development activities, especially with aim at meeting compliance and improving performance. The findings also suggested that joint initiatives through collaborative approaches with critical industrial suppliers focused more environmental practices, such as co-design of more efficient packaging and machine.

The findings can be useful for a supply chain management practitioner in mapping practices adopted in the selection and monitored, and make decisions for future direction.

8.3.2 Organisational factors for sustainability practices diffusion

34 of 36 factors identified in the literature were confirmed in the case studies. Four factors previously identified in the literature as being influential for a particular supply chain activity were also evidenced in another. Three new organisational factors were evidenced in the supplier selection, performance assessment and development. Figures 7.2, 7.4 and 7.7 framed the organisational factors affecting the sustainability practices diffusion. They provided a more comprehensive view on how sustainability practices were diffused through the supplier selection, performance assessment and development. This work is the first instance of considering intra (internal) and inter (external) organisational factors in the same model for enhancing the diffusion of sustainability practices across the supplier base. This answers the research questions RQ1 (How are environmental and social sustainability practices diffused across the supplier base?) and RQ3 (What are the influential organisational factors in the supply chain management activities for diffusion of environmental and social sustainability practices?)

Industrial suppliers located in the first tier regardless of the volume of business were evaluated using evaluation mechanisms (e.g. self-evaluation questionnaires and 2nd and/or 3rd party audits), which considered sustainability as being equally important as the traditional dimensions (e.g. cost, quality, delivery). Considering sustainability as equally important in the evaluation (OF37) was a critical factor for influencing suppliers to implement sustainability practices.

Constant review of the performance measures (OF38) is crucial for adopting appropriate, feasible and realistic measures. This was found to be critical for inducing suppliers to meet compliance and progress in the overall sustainability performance. Collaborative approaches with suppliers (OF30) were also found to be critical in the design of the sustainability requirements and supplier performance assessment programmes (designing of performance measures). The literature has covered this only as an influential factor for implementing sustainability performance assessment and for designing and implementing supplier development.

Evidence showed that training purchasing staff on sustainability (OF23)was critical for supporting suppliers during the evaluation process in the selection. It was also found that the volume of business with suppliers influenced them to carry out the performance assessment programmes.

Overall, this depicts patterns of the factors and points out the most critical variables influencing the diffusion of environmental and social sustainability practices. This provides a foundation by which the diffusion of sustainability practices occurs.

8.3.3 Diffusion of innovation theory

Diffusion of innovation theory was applied considered different elements that have not been covered in the literature. This application, which took into consideration the context of the diffusion of sustainability practices led by buying firms across their supplier base, extends previous researches:

- it encompasses different sustainability practices.

- it highlights the role of the buying firms on the impact of supplier's innovation decision process.

- the communication channel and social system are applied to evaluate the impact of buying firms on the suppliers' decision.

The communication channels affected the supplier decision process to implement sustainability practices in different ways (Figure 7.10):

- ***Selection*** - communication of requirements, supplier evaluation and contracts were communication channels used to ensure compliance. Providing a clear meaning of sustainability and basis for measuring performance and giving equal importance for sustainability in the supplier evaluation acted as enhancers for diffusion of sustainability practices in the supplier selection.

- Performance assessment – definition of consistent performance measures, performance mechanisms and supplier feeding back were the communication channels to monitor compliance and promote improvements in performance. Supporting and assisting suppliers and the volume of business were enhancers in the performance assessment. Interestingly, use of industry codes/principles also helped the dissemination of common practices.

- Development – Definition of supplier sustainability development initiatives and the assessment of the impact of them were the communication channels were critical not only for meeting compliance and improving performance but also for building supplier capability and integrating strategies. Risk management was an enhancer especially in joint initiatives for improving packaging and joint venture.

Engagement of stakeholders and collaborative approaches with suppliers were also critical enhancers for supporting supplier to pass through the innovation decision process to implement sustainability practices. The rate of adoption of sustainability practices were directly affected by supporting suppliers in measuring and collaborating in implementing improvements plans, as well as intense educating initiatives.

DoI provides a powerful lens to help to explain the role of buying firms in the diffusion of sustainability practices. This also helped to answer the research questions RQ4 (How do organisational factors affect the diffusion of sustainability practices across the supplier base?) and RQ5 (How can sustainability diffusion across the supplier base be enhanced (buyer perspective) based on the diffusion of innovation theory?.)

This research has potential to serve as an analysis tool to uncover gaps in activity that could lead to greater adoption of sustainability practices by suppliers, as well as gathering good practice in a structured way.

8.4 LIMITATIONS AND OPPORTUNITIES FOR FURTHER RESEARCH

There are multiple promising avenues for pursuing further research. One clear limitation of this study is its scope as it only reports from the buying firms'

perspective. Even suppliers were also engaged in the data collection, more evidence from the suppliers' perspective is needed. For instance, what communication channels (diffusion mechanisms) are more effective and in which conditions they could be investigated.

Moreover, this research focused on large-size sustainability leading manufacturing firms from beverage, cosmetics and textile sectors. Different sectors and size of firms could be involved.

Some organisational factors need to be further investigated, such as the impact of the volume of business in the implementation of sustainability practices by suppliers, as well as the proper approaches for reviewing the supplier performance assessment programmes.

The conclusions drawn from this enquiry are based on qualitative methods through case studies. In order to increase the external validity, a larger sample of firms could be engaged in an empirical test.

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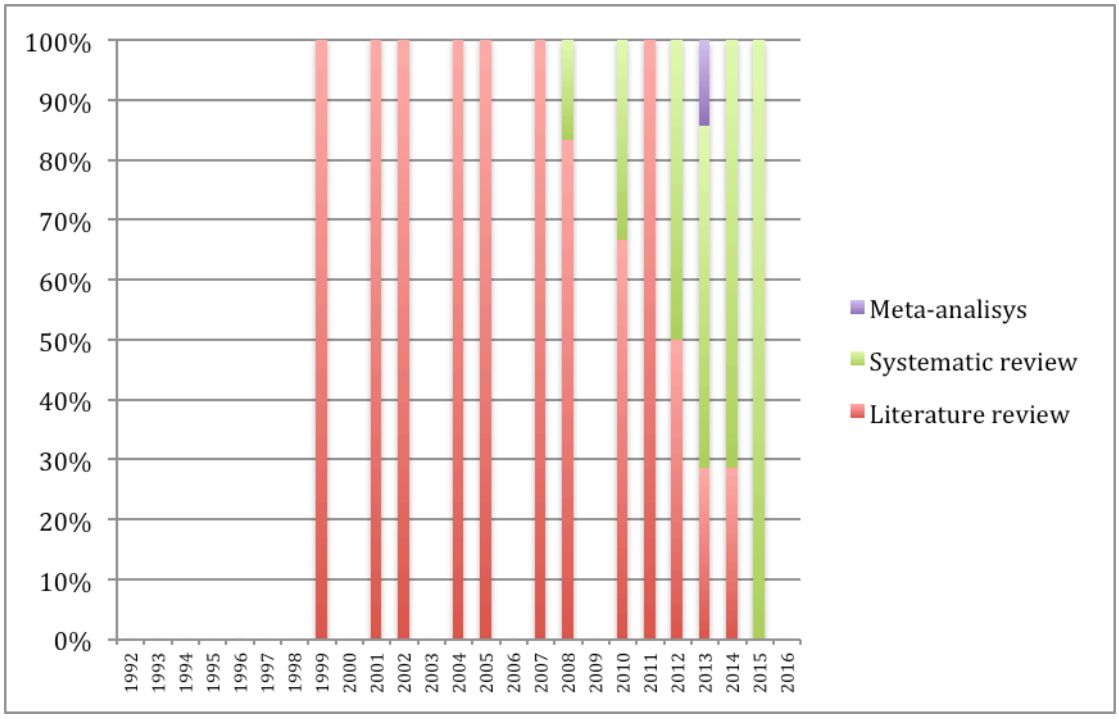
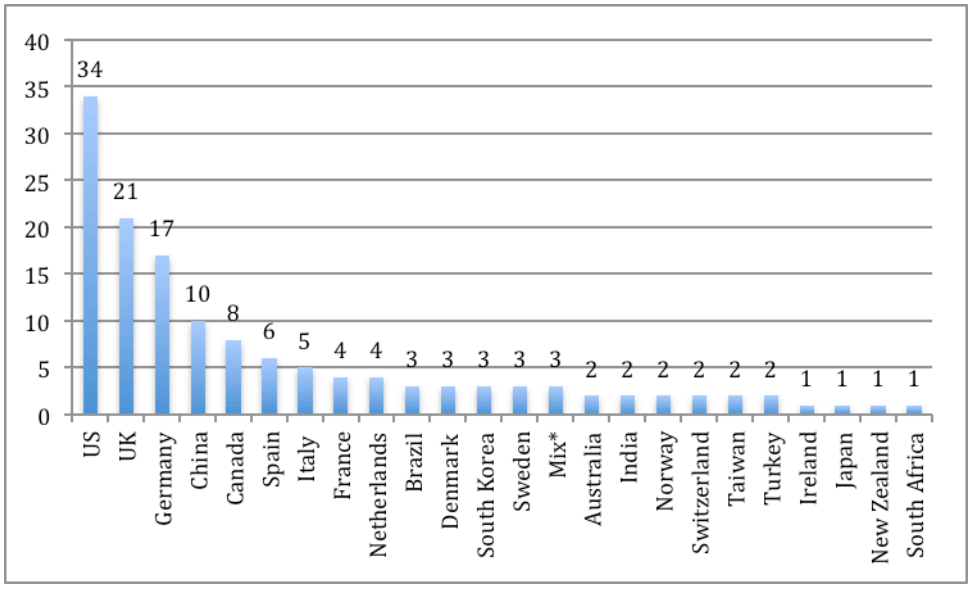
Appendix A – Distribution of review papers.



Appendix B – Distribution of papers according to the country of the 1st author.



Appendix C – Interview protocol

Part 1 – Sustainability journey

1.1 What are the key issues in terms of sustainability that the firm has faced?

1.2 Describe some sustainability practices that have been implemented in order to improve sustainability performance?

1.3 What are the main drivers for these initiatives?

1.4 Have you conduct any environmental study with product lifecycle perspective (LCA, carbon footprint). If so, have got date collected at suppliers level?

Part 2 – Understanding the relationship with suppliers

2.1 How does your firm build long-term relationship with your suppliers?

2.2 Has your firm got standards or guidelines regarding the relationship with its suppliers established in the policy? Please, if so could you describe (e.g. The strategic plan of the purchases, Ethics code of conduct)?

2.3 What are the key sustainability issues/critical aspects that your has faced in its supplier base?

2.4 Do you collaborate internally with other functions to manage your suppliers relationship (e.g. production, quality, environmental, etc.). If so, who are involved?

Part 3 – Understanding the supplier base

3.1 Supplier base mapping.

Suppliers Base / key materials supplied	How many suppliers?	Have you got a long-term relationship? Overall, How long have you been working with them?	General location?	Have you got Sustainability requirements to SELECT them? *[Yes or no]* * Details in the Part 4	Do you MONITOR your suppliers in terms of sustainability performance (CSR)? *[Yes or no]* * Details in the Part 5	Do you DEVELOP your suppliers in terms of sustainability performance (CSR)? *[Yes or no]* * Details in the Part 3

3.2 How are suppliers classified (e.g. critic or strategic?)

Part 4 – Understanding the supplier selection processes

4.1 What sustainability requirements/specifications do you use to select your suppliers? Please, describe your list of requirements? Is it common for all suppliers?

4.2 How were they designed (i.e. departments involved, alignment with the Ethic code of conduct or sustainability programme)?

4.4 How are they communicated to suppliers? Are the sustainability requirements established as a formal specification or informal (recommendations)?

4.5 How do you evaluate your suppliers **before** starting the business with it?

4.6 Are the sustainability requirements included in the ***performance assessment programme? (minimum or desirable)*** and/or established as a parameter for supplier development programme?

4.7 How do you assure that the 2nd tier suppliers work in line with sustainability standards?

4.5 Have you got contract to formalise the relationship with suppliers? If so, are there clauses describing the sustainability requirements?

Part 5 – Understanding supplier performance assessment (Monitoring)

5.1How does your firm monitor the supplier sustainability performance?

Identifying:

- What kind of suppliers are included in the assessment (e.g. growers, packaging suppliers)?
- What are the criteria used to monitor suppliers?
- What are the KPIs monitored (e.g. environmental and social KPI's - Core and recommended)?
- What are the mechanism and/or tools employed (e.g. self assessment, audits, scorecards, database)?
- Frequency (e.g. yearly, others)
- People internally engaged (e.g. from CSR team, sourcing team) and how?
- Who is responsible for pay the cost of the assessment?

5.2 What are the key problems observed during the assessment?

5.3 Have you observed significant differences in the results from suppliers located in different countries?

5.4 How are the outcomes of the assessment shared with suppliers?

5.5 How are suppliers engaged to improve their performance based on the outcomes of the assessment?

5.6 How is non-compliance treated? Does your firm usually support its suppliers in this circumstance, if so how?

Part 6 – Understanding supplier sustainability development initiatives

6.1 How does your firm engage its suppliers on sustainability?

6.2 What are the main sustainability areas/themes/practices covered?

6.3 How does your firm disseminate knowledge on sustainability across its supplier base? Could you provide an overview of what your firm has been done?

Identifying:

- What are the sustainability parameters used to assess the suppliers in the initiative?
- What are the benefits of the initiatives?
- What is the profile of the suppliers engaged (size of the companies, volume of business, investments in sustainability, are they usually attend the training provided by your firm)
- Who is responsible for pay the cost involved?
- What is the profile of suppliers, which usually attend (size of the companies, location, volume of business wit Illy, overall how long have you been work with them?),
- What are the benefits of this programme?

6.4 What are the challenges to work with suppliers on sustainability?

6.5 How are risks and rewards of supplier sustainability development programme managed?

6.6 What on-going efforts have you done to improve your suppliers?

6.7 What is the main motivation for working with suppliers on sustainability?

6.8 What aids working with suppliers on sustainability?

6.9 Who else influence your sustainability performance and how?

6.10 Who else do you influence in terms of sustainability and how?

Part 7 – Understanding the role of other functions involved with supplier sustainability

7.1 Could you describe the role of your function and your role?

7.2 How does your function interact with supplier?

7.3 Is your function involved in initiatives to improve suppliers' sustainability performance? If so, please describe how?

7.4 What are the main issues that you have faced with suppliers?

7.5 What is the main motivation for working with suppliers on sustainability (Drivers)?

7.6 What aids working with suppliers on sustainability (Enablers)?

Appendix D – An example of transcript - Interview -

... we want to share best practices with farm growers. Knowledge on how to transfers is our way that the see sustainability, because if you improve the skill of the producers related to quality - process, organisation...in Brazil they are larger producers, when you convince them to produce with quality.... small growers are problematic in terms of the organisation, when they are organised, in general in cooperatives, they are more organised to sell the coffee and not to produce the coffee.

...This is more complicated when the supply chain increase the complexity in terms of number of actors, cultural barriers and logistics (organiser coffee growers, for instance in Peru there is a huge distance between the farmers and the warehouse, so there is some intermediates between farms and the cooperative, this means that the price is not added to farmers, in terms of knowledge is hard to transfer to them. we try to push the organisation of coffee growers, but if they are not convinced, they are not implement. so the best think to do is try to find who are the best actors, such as the director in cooperatives who really believe in quality. Find exporter that have the best quality. In Brazil, we can have direct contact and contracted with famers and integrate the supply chain. Having contact with the farmers we can integrating the supply chain management so we go to the farmers, and as result of this we have traceability. The farmer is one of the actors, and this can say this is the main important. To integrate the supply chain, we have to understand who are the actors, how they are linked, and who cause the driving changes. Integrating the supply chain management is our way to be sure that we have the quality and quantity that we want. We don't look the commodity coffee we look to a specified special coffee.

Direct contact with suppliers, this is the ("Beverage B")'s strategy started in 80 in Brazil. It was a success; hence at that time the growers in Brazil were looking for of to be linked with the international market and they didn't have any opportunity before. What ("Beverage B") did it was very innovative, it was the first one who entered in Brazil, put its face and given to growers the opportunity to have a direct deal with the final buyer. This was the main reason why we had a great success and we are very structured there. This is the same approach that we try to address in the other regions. To implement a new supply chain we needed at least three years. When you entered how the supply chain is structured, the different actors, and than seen which of them the cheapest quality. This is long term relationship is so important for us. When you find a growers who really understand the business and what to do so it is better to grown with them.

It is mandatory for us is to have a really traceability. But sometimes this is not possible because the structure of the supply chain. But when we know that the coffee is bought from a group of 500 growers, we work with then, so traceability is a consequence of the organisation. We work with them in terms of respect with requirements, child labour, and use of pesticides. What we do is when you have the relationship with them is to build the responsible supply chain process, checking the process, visiting them with our technicians and verification by Veritas. The responsible supply chain management process of green process is audit and certified by them

We monitor suppliers in terms of they respect the contract, number of sample, if they are provide to provide the quality that we want it, if they need more training capacity, once per year and adviser them, the processes.... considering the exporters, they signed the contract with the farmers, they are who can drive the chance, for instance in Colombia, there is farmers that don't know ("Beverage B") because there are 500,000 famers that, so we have to work close to exporters. So we also visit the farmers to ask them if they fit well with the exporters, to see how to the exporters interacting with the farms and given them the possibility to claim about the export, and check if export bad behaviour from the farms. This gives us a direction to maintain and increase the source of the coffee in an integrated supply chain.
We financed the study in Brazil, we participate in a international platform on carbon emission in the sector 9member). We have to move to the right way to irrigate, start in Brazil....in some areas... we collaborate with the university of coffee, in stimulating coffee growers; we collaborate with our research and development on what know-how we can provide for growers.

Appendix E – Ecovadis database

Measures used. Source: < http://www.ecovadis.com/>

Criteria	Measures	
Environment	*Operations* - Energy/CO2 - Water - Biodiversity - Pollution - Waste	*Products* - Product use - Product end of life - Customer safety - Advocacy
Social	*Human resources* - Employee health and safety - Working conditions - Social dialog - Career management and training	*Human rights* - Child and forced labour - Non discrimination - Fundamental human rights
Ethics	- Corruption and bribery - Anti-competitive practices - Responsible marketing	
Sustainable procurement	- Suppliers environmental performance - Suppliers social performance	

The scorecards are based on international standards, such as ISO 26000, ISO 14001, OHSAS 18001 and leading international sustainability standards like including GRI, global compact principles, CERES principles and International Labour organisation (ILO). The scorecards are also customised according to the suppliers' activities, i.e. industrial sectors, size and geographic location